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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ORIGINAL ARTICLES

Treatment of Intracapsular Fractures of the Femoral Neck.
Selection of Cases—Reduction of the Fracture—Insertion of the Nail—The Nailing Operation.
A. S. BLUNDELL BANKART, F.R.C.S. (*diagram*) 249

Physiological Effects of Blast.
Mode of Action of Blast on the Body—The Heart—Blood-pressure—Respiration—Cerebral Cortex.
P. L. KROHN, B.M., D. WHITTERIDGE, B.M., S. ZUCKERMAN, M.R.C.S. (*illus.*) 252

Incidence of Perforated Peptic Ulcer: Effect of Heavy Air-raids.
D. N. STEWART, D. M. DE R. WINSER (*charts*) 259

Diphtheritic Diaphragmatic Paralysis treated in Box Respirator.
J. M. TODESCO, M.D... 261

Civilian Convalescent Treatment.
J. OWEN REID, M.D. .. 278

REVIEWS OF BOOKS

Age Morphology of Primary Tubercles. Henry C. Sweany, M.D. 262

Jameson and Parkinson's Synopsis of Hygiene. Editor: G. S. Parkinson, M.R.C.S. 262

LEADING ARTICLES

RUSSIAN INTERCHANGE .. 263

PLANNED TREATMENT OF THYROTOXICOSIS 263

STUDENTS IN UNIFORM ?.. 264

ANNOTATIONS

Chemical Tests for Vitamin Deficiencies 265
Resuscitation in Shock ... 265
Chemotherapy in Scarlet Fever 266
Among the Leaves So Green-O 266
Economy in the Museum.. 267
Tests for Simmonds's Disease 267
Lord Midleton and the Army Medical Service .. 268
Rockefeller Studentships: Wanderjahre 268
A German Psychiatrist ... 268
New Official Names for Drugs 268
Canteens at Work 268

SPECIAL ARTICLES

Medicine and the Law: Relief from War Indebtedness—The Works Doctor 269
Industrial Dermatitis..... 269
Boroughs Plan Typhus Control 270

IN ENGLAND NOW

A Running Commentary by Peripatetic Correspondents 271

LETTERS TO THE EDITOR

Surgical Instruments for Russia (Sir Alfred Webb-Johnson, F.R.C.S.) 275
Relapsing Fever (Dr. Melville Mackenzie) 275
The Premedical Curriculum (Mr. L. C. Beadle, M.A.). 275
War-time Nurseries (Dr. Violet Russell) 275
Not so Sterile Labels (Dr. Langton Hewer, Prof. Lawrence Garrod, F.R.C.P.) 275
Corrosive Stricture of the Stomach (Mr. C. A. R. Schulenburg, F.R.C.S.) .. 276
Crush Fractures of the Os Calcis (Dr. James Mennell) 276
Control of Rats (Captain C. W. Hume, B.SC.) 276
Unwanted Instrument Catalogues (Down Bros. Ltd.) 276
Gingivitis in the Forces (Dr. Frederick Stuhl) 276

PARLIAMENT

On the Floor of the House 272
Question Time: Medical Man Power—Anti-typhus Precautions—Conditions in the Pottery Industry—Qualification for War Pensions—National Health Insurance—Employment of Married Nurses—Wheatmeal Bread in British Restaurants—Exemption of Women Doctors and Dentists 273

PUBLIC HEALTH

Experiment in School Feeding..... 274

MEDICAL SOCIETIES

ROYAL SOCIETY OF MEDICINE: Section of Neurology: Cerebral Œdema 262

OBITUARY

Sir John Hebb, B.M. (*with portrait*) 277
Surgeon-Lieutenant David Anderson Miln, M.R.C.S.. 277
Lieutenant Iain Alasdair Macmillan Beaton, M.B. (*with portrait*) 277

NOTICES

Health of Cape Town..... 279
Doctor in the Lions' Den.. 279
Acute Intestinal Obstruction 279

MEDICAL NEWS

University of Cambridge .. 280
Royal Society of Medicine . 280
Tuberculosis in Scotland .. 280
Ophthalmological Society . 280
Medical Honours 280
Conference on Physical Education 280
Medical Society for the Study of Venereal Diseases 278
Royal Medico-Psychological Association 272

Index to THE LANCET, Vol. II, 1941..... 268

Appointments—Births, Marriages and Deaths .. 280

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Contributors: G. A. H. BUTTLE, M.R.C.S., ROBERT CRUICKSHANK, M.D., LAWRENCE P. GARROD, M.D., W. H. OGILVIE, M.Ch., and L. E. H. WHITBY, *C.V.O.*, M.D.

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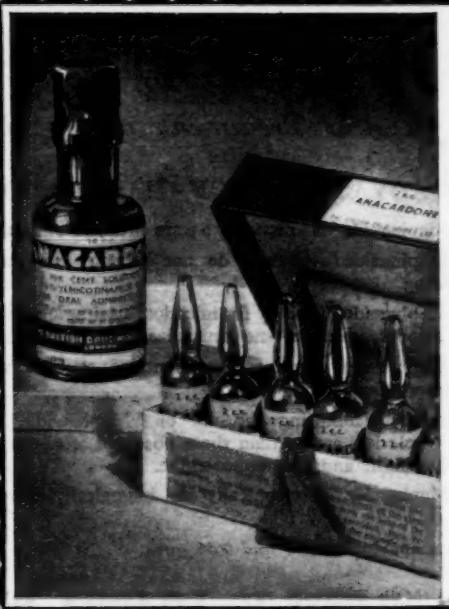

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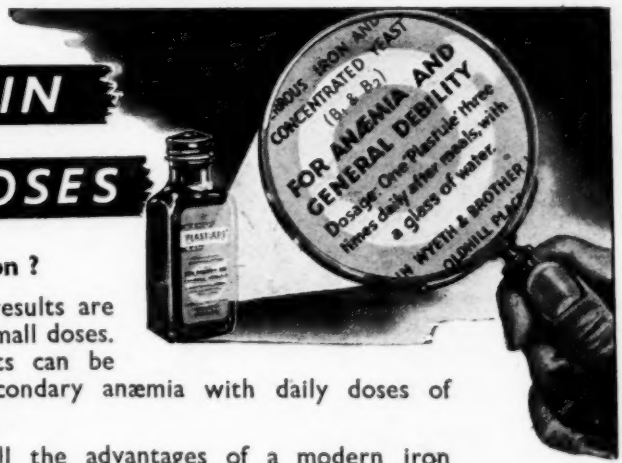

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IT is generally agreed that, whenever the condition and the circumstances of the patient permit, an intracapsular fracture of the neck of the femur should be accurately reduced and fixed with a Smith-Petersen nail or similar device. The only notable exception to this rule is the subcapital abduction fracture in which the head of the bone is slightly displaced and impacted on to the upper border of the fractured neck. This fracture always heals with bony union if it is treated in a short walking plaster for 12 weeks. It will come as a shock to many surgeons to learn that in approximately 1 out of every 3 cases the nailing operation, as usually done, is a failure. THE LANCET (1941) has drawn attention to two recently published series of end-results, both of which show a high percentage of ultimate failures. There is no reason to suppose that these records are exceptionally bad, and the conclusion is reached that "clearly the intracapsular fracture of the neck of the femur still presents a formidable problem."

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There are local as well as general conditions to be considered before doing a nailing operation. I doubt whether the operation is worth doing in the case of the high subcapital adduction fracture, when the head of the femur is broken off practically flush with the acetabulum. However accurately the nail is placed, the mechanical fixation of the head is likely to be precarious and bone absorption, with slipping of the head off the end of the nail, is often observed. In such cases it is better to do a transtrochanteric osteotomy at once rather than wait for the failure of a nailing operation.

In some cases fracture of the neck of the femur is a torsion injury, being produced by an inward twist of the body while the foot is fixed on the ground. When this happens, the anterior part of the neck is broken across more or less transversely, but the thin bone in the concavity of the neck behind is crushed together as the fragments angulate. When this type of fracture is reduced the anterior parts come together accurately, but a wide deficiency is opened up behind as the angulation is corrected. In the days when open reduction and fixation of these fractures was done I have more than once exposed this condition and have observed that, when a drill or other instrument was passed into the neck, it lay bare and exposed at the bottom of the deficiency in the bone. It is difficult to imagine how such a defect could be filled up with bone in the process of healing, and it would seem that even a bone-graft would have a precarious existence in such a situation.

Osteo-arthritis of the hip is common in old people, and it would be interesting to know how many patients with fracture of the neck of the femur already have osteo-arthritis at the time of the accident. Osteo-arthritis may cause limitation of movement long before there are appreciable X-ray signs of it. In examining a case of osteo-arthritis of the hip it is not uncommon to find that there is some limitation of movement, especially of rotation, in the opposite "sound" hip, although no complaint has been made of it. If the head of the femur cannot move freely in the acetabulum after a fracture of the neck has been nailed, great strain will be put on the proximal-fragment when the hip is moved, and this may cause damage to the head, leading to absorption and non-union. If osteo-arthritis is present or suspected, the fracture should not be nailed, or, if nailed, the hip should be immobilised as well. But it would be better to do an osteotomy instead.

Traumatic osteo-arthritis of the hip is not uncommon after comparatively trivial injuries in elderly people, and it is not unreasonable to suppose that the same injury which fractures the neck of the femur may also produce osteo-arthritis. Can anything be done to prevent this? Does movement increase this liability? Should the hip be kept at rest until the traumatic reaction has settled down? The question of immobilisation will be considered in relation to the after-treatment of the nailing operation.

Interference with the blood-supply of the proximal fragment has been held responsible for absorption of bone and non-union. But in every complete fracture of the neck of the femur the proximal fragment is for the time being deprived of its blood-supply, for I do not think anyone really believes that the circulation is maintained through the ligamentum teres; so that if this were the cause one would expect absorption to occur in practically every case. It is possible, however, that while the head is deprived of its blood-supply it is more vulnerable to stresses and strains which may fall upon it.

Considerable importance has been attached to the direction of the fracture as determined by the angle which the fracture line makes with the horizontal (Pauwel, quoted by King 1939) or with the shaft of the femur (Eyre Brook and Pridie 1941). It has been pointed out that the more vertical the fracture line, the greater the shearing force and the less the thrust between the fracture surfaces, and therefore the less the likelihood of bony union; while the more nearly the fracture line approaches the horizontal, the less the shearing force and the greater the thrust, and therefore the greater the chances of bony union. It has been suggested that the more vertical fractures are unsuitable for nailing alone and that bone-grafting should be done in addition. It will be noted that these observations imply: (1) that a vertical (weight-bearing) force will be put upon the fracture before it has united; (2) that a shearing force can operate between the fracture surfaces, although the whole point of the nailing operation is to prevent it; and (3) that a thrust or impacting force is a factor in bringing about bony union. Clearly these mechanical conditions have a bearing on the technique of the nailing operation which will be considered presently.

There is no general agreement as to how the patient should be treated after a fracture of the neck of the femur has been nailed. Some surgeons allow walking almost at once, while others forbid it for about 4 months, believing that too early weight-bearing is a cause of absorption of bone and non-union. But all encourage active movements of the hip during this period.

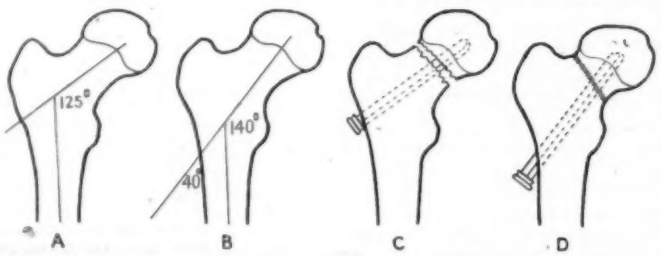
In this connexion it is interesting to recall that the impacted subcapital *abduction* fracture always heals with

bony union, if it is treated in a short walking plaster spica, and in this case early weight-bearing does not lead to absorption of the head of the femur. Böhler (1935), however, makes the significant statement that he has "often seen marked changes in the head of the bone and pain, in cases of abduction fractures which have not been immobilised, but these do not occur if the fracture has been fixed"—that is, in a short walking plaster. If this is true, it suggests that weight-bearing on an impacted fracture is not in itself harmful, so long as the joint is not moved, but that weight-bearing and movement together lead to changes in the femoral head. We shall have to consider whether this has any bearing on the treatment of *adduction* fractures after internal fixation, whether in fact the nailed adduction fracture ought not to be treated in the same way as the impacted abduction fracture—in a short walking plaster.

When cases unsuitable for nailing have been eliminated, the principal causes of failure are: imperfect reduction of the fracture; faulty application of the nail; and inappropriate after-treatment.

REDUCTION OF THE FRACTURE

Accurate reduction of the fracture is an essential part of the nailing operation. There are four ways in which this may be done: (1) by preliminary weight-extension in bed; (2) by the manipulation described by Leadbetter; (3) by traction and manipulation on an orthopædic extension table; and (4) by the "well-leg counter-traction" method of Roger Anderson.



The great advantage of reduction by weight-extension is that there is no hurry. The surgeon can play with it, adjusting the weight and the position of the limb, until it is just right. Moreover, the patient has time to settle down. The disadvantage of this method is the difficulty in getting the patient from his bed to the operating table without disturbing the reduction of the fracture. To meet this difficulty Bailey (1937) advocated a "complete bed technique," doing the nailing operation in the patient's bed with the extension still on the limb. This would be ideal, if one could be persuaded that it is an operation which can properly be done in a bed. Most surgeons prefer to reduce the fracture on the operating table.

The disadvantage of reducing the fracture on the operating table, whether by manipulation or by means of an extension table, is that the reduction is not always perfect at the first or even the second attempt. But the surgeon is always anxious to get on with the operation, and he is tempted to accept as good enough a reduction which he really knows is not perfect. The Leadbetter method certainly gives a good reduction in many cases, but it is not infallible and we have to admit that there is an element of luck about it. When an extension table is used a good reduction can generally be assured, but far more time is taken in fixing the limbs to the extension bars and reducing the fracture than most surgeons are willing to admit; and here also the surgeon is working against time.

In my unit we have now overcome these difficulties by using the Roger Anderson method of well-leg counter-traction, which, as its name implies, makes traction on the injured limb by using the sound limb for counter-traction or resistance. By this method the fracture is quickly reduced but it can be checked and if necessary adjusted at leisure, and when the reduction is perfect the patient can be lifted safely on to the operating table with the traction still on the limb. The original apparatus has been modified by Mervyn Evans (1941) and adapted for skin traction, so that it is not necessary to put a pin through the tibia. Sufficient traction can be obtained by adhesive plaster for the short time required to reduce and nail the fracture.

INSERTION OF THE NAIL

It is a common practice to place the nail in the long axis of the neck of the femur—that is, at an angle of about 125° with the shaft. Indeed, many of the special instruments invented for this purpose are made to fit the curve of the bone where the great trochanter joins the shaft. But it is clear that with the nail in this position the greater part of a vertical force will fall across the nail while a very small part of it, if any, will be directed outwards along the nail (A in figure). Therefore, if early weight-bearing is permitted there will be a considerable danger of the nail breaking and no tendency to press the fracture surfaces together. On the other hand, the more vertically the nail is placed the less will be the breaking strain across it and the more will the proximal fragment be guided towards and pressed against the distal fragment by pressure from above. The best angle for the nail is one of 140° with the long axis of the shaft of the femur (B in figure).

It must be remembered that a nail can hold fragments apart as well as hold them together. If the slightest gap exists between the fragments, either from absorption of bone or from insufficient impaction of the fracture, non-union will occur unless the gap can be closed. If the nail is placed too horizontally, the gap will not be closed; indeed, the fragments will be actually held apart (C in figure). But, if the nail is placed at an angle of 140°, pressure from above will be directed downwards and outwards and the proximal fragment will be guided by the nail into contact with the distal fragment (D in figure).

So far from early weight-bearing being a cause of non-union, I believe that it is almost essential for bony union, and that absence of this factor is actually responsible for non-union in many cases. The need for positive pressure between the fracture surfaces has been recognised by a number of surgeons who have devised special screws or bolts which are intended to exert an approximating action on the fragments. But by far the most effective approximating force is the body-weight, provided that it is made to act in the required direction. The Smith-Petersen nail is to be regarded not merely as a means of holding the fragments together but as a sort of slide which will direct and carry the proximal fragment towards the distal fragment when pressure is brought to bear on it from above. That weight-bearing favours bony union has been shown by Kleinberg (1937), Apfelbach and Aries (1936), and others in the ambulatory treatment of fractures of the neck of the femur in long abduction plasters. The Smith-Petersen nail, however, obviates the obvious disadvantages of the long plaster.

Sometimes the nail is partially extruded from the bone after a nailing operation, and steps have been taken to prevent this by fixing the head of the nail to the cortex of the shaft of the femur. Such devices are ill-conceived and may be disastrous. A nail which has been properly put in does not drop out of the bone but it may be pushed out. Partial extrusion of the nail means that some absorption has occurred at the fracture line, and the proximal fragment is settling down on to the distal fragment carrying the nail with it (D in figure). If this is prevented, the fragments will be held apart by the nail and the fracture will fail to unite (C in figure). Radiograms taken some time after a successful nailing operation nearly always show some shortening of the femoral neck.

A nail can be inserted quite accurately into the required axis of the neck of the femur by following a few anatomical directions and without the use of any special aiming devices or gadgets.

If a line is drawn from the centre of the femoral head downwards and outwards at an angle of 140° it will cut the outer surface of the shaft at a point 1½ in. below the base of the great trochanter and at the complementary angle of 40° with the shaft below this point (B in figure). This measurement is practically constant in the normal adult femur. Incidentally, this point is on a level with the base of the lesser trochanter which also may be used as a guide. If sufficient of the shaft is

exposed, the angle of 40° (a little less than half a right angle) can be easily estimated by eye, or if help is needed a little triangular metal plate can be used to give the required angle. Moreover, if the base of the plate is made exactly 1½ in. long, it can be used also to measure the distance from the base of the great trochanter.

At this level the anterior surface of the shaft of the femur is an almost flat surface having the same inclination to the coronal plane as has the neck of the femur, so that if a guide is entered at a point on the outer surface midway between the anterior and posterior borders, and in a plane parallel to the anterior surface, it will be correctly placed in the lateral radiograms. Bailey has used this flat surface to give direction to his special aiming device. But this instrument is made to fit the curve of the bone immediately below the great trochanter, so that the nail is inserted too high and too horizontally.

I believe that more accurate work can be done when the site for the insertion of the nail is exposed to view than by any method of blind pinning. Moreover, it is possible to do a clean operation through an adequate incision, whereas strict asepsis is not possible when instruments are passed in and out of a small wound and allowed to come in contact with the skin. It may not be out of place here to recall Arbuthnot Lane's dictum that, in the operative treatment of fractures, loosening of screws and absorption of bone are due either to faulty mechanics or to a degree of sepsis which is not recognised in ordinary surgery. The nailing of a fracture of the neck of the femur should be done with the same exact care and attention to asepsis as any other important bone operation. It is rather regrettable that some surgeons seem to have vied with one another in doing this particular operation through the smallest possible incision and in the shortest possible time.

THE NAILING OPERATION

The steps of the nailing operation may be summarised as follows:

(1) The fracture having been reduced by the well-leg counter-traction method, the patient is anæsthetised, preferably in bed, with 'Pentothal' followed by gas and oxygen. He is then taken to the theatre in the traction apparatus and placed upon the operating table. An X-ray cassette-holder is placed under the affected hip, so that films can be inserted and removed from the opposite side of the table. It is most desirable that two X-ray machines should be available, so that that they can be left in position throughout the operation. Anteroposterior and lateral radiograms are taken at once, both as a final check on the reduction and to ensure that the X-ray tubes are correctly placed.

(2) The skin is painted with iodine or spirit and sterile towels are placed in position. An incision is then made on the outer side of the thigh so as to expose at least 3 in. of the upper end of the shaft of the femur. The length of the incision depends entirely on the depth of the bone from the surface. If the incision is too short, it is impossible to apply the guide at the correct angle to the bone. Sterile towels are, of course, fixed to the sides of the wound.

(3) When the outer surface of the bone has been exposed, a flat instrument is passed along its anterior surface just below the level of the great trochanter, and if this surface is not exactly in a horizontal plane the limb is rotated slightly until it is horizontal.

(4) At a point on the outer surface, 1½ in. below the base of the great trochanter and midway between the anterior and posterior borders, a small hole or depression is made with an awl. The awl is held at right angles to the surface of the bone. It is impossible to start a drill accurately at an acute angle to the hard cortical bone unless a hole or depression is made first. I have found it convenient to bevel the sides of the hole with a small rose-head burr.

(5) A 2·5 mm. guide mounted on a hand drill or motor is directed into the hole at an angle of 40° with the shaft below and strictly in the horizontal plane—that is, parallel to the anterior surface of the femur. As already stated, a small metal gauge may be used to measure the angle. A little rubber ring (cut from a piece of tubing) is previously placed on the guide at a distance of 3½ in. from the point, and a second rubber ring is placed 2 in. higher up. The total length of the guide is 10 in. The guide is now rapidly driven into the bone for exactly 3½ in. (up to the first rubber ring).

(6) Anteroposterior and lateral radiograms are now taken and quickly developed. From these films three observations are made: whether the guide is correctly placed in both planes; whether the length of guide in the bone is the correct length for the nail; and what further penetration is needed to fix the point of the guide in the acetabulum.

If the technique here described has been carefully followed, it will rarely if ever be found that the guide is not correctly placed. When the guide is inserted at an angle of 140°, it will generally be found that a 3¼–3¾ in. nail is required. The correct length can easily be estimated from the known length of guide in the bone. Allowance must be made for impaction of the fracture. A further penetration of 2 in. will usually suffice to fix the point of the guide in the acetabulum, and it will be remembered that there is already a second rubber ring placed at this distance further up the guide. All these points can be seen at a glance in the radiograms. When they have been satisfactorily determined, the first rubber ring, which is now in contact with the bone, is slipped up the guide as far as the second, and the guide is driven in for a further 2 in.

The importance of anchoring the proximal fragment to the pelvis while the nail is being driven in will be appreciated by anyone who has exposed this fracture at open operation. Since the smooth head of the femur slips about in the acetabulum on the slightest provocation the comparatively blunt end of the on-coming nail is likely to cause displacement unless the head is fixed by the guide. It is not enough that the guide should merely penetrate the head. Cases have been reported in which the end of the guide was bent by the displacing action of the nail. When the guide is driven right through into the acetabulum, the head is securely held and no such displacement can occur. No harm has ever been reported from the small punctures of the articular surfaces.

(7) The drill or motor is now detached. A Smith-Petersen starter is passed over the guide and placed so that one of its fins is directed towards the upper border of the femoral neck. The starter is gently tapped into the bone, care being taken not to split the bone. When the cortex has been penetrated, the starter is withdrawn and the selected nail is threaded over the guide and driven home with a punch. When the head of the nail reaches the bone, a large punch is used, which overlaps the head of the nail, so that the bone and the nail are struck together. The extension cord is now cut and the fracture is impacted by a number of heavy blows on the punch with the mallet. The guide is now pulled out with pliers, and final radiograms are taken.

(8) The divided muscles are sutured with catgut and the skin with silkworm gut. The extension apparatus is removed and the patient is returned to bed.

(9) The skin stitches are removed on the tenth day, and a short plaster spica is applied. For reasons already given it is desirable, if not essential, to get the patient up and walking soon after this operation. Most patients should be walking in 2–3 weeks. The mechanical safety of the hip depends almost entirely on the angle at which the nail is inserted. Whether movement of the hip should be allowed at this stage is open to question. If movement is harmful in the case of the impacted abduction fracture, it is difficult to avoid the conclusion that it may be equally harmful to the nailed adduction fracture, so that we are now fixing the hip in a short walking plaster for twelve weeks after the nailing operation. Time alone will show whether this is necessary or desirable.

SUMMARY

Poor results often follow internal fixation of fractures of the neck of the femur. Many of these results have been obtained by experienced surgeons who may be presumed to have mastered the technique of the methods they employ. Their results, therefore, are not likely to be improved by a slavish adherence to the same methods.

Many cases are unsuitable for the nailing operation. Such cases should be eliminated and treated by other methods. Indiscriminate nailing will inevitably give a high percentage of failures.

Imperfect reduction of the fracture is often seen in the radiograms of published cases. This is usually due to hurry and to the unwillingness of the surgeon to prolong or postpone the operation when first attempts at reduction have been only partially successful.

The well-leg counter-traction method enables the fracture to be reduced at leisure and the operation to proceed as soon as the patient is on the operating table.

Too much attention has been paid to the technique of inserting a nail into the long axis of the neck of the femur and too little thought given to what the nail does when it gets there. The use of the nail is not merely to

hold the parts of the fracture together but to convert a shearing force into a thrust or approximating force, when weight is borne on the fracture. The angle at which the nail is inserted is therefore most important.

The operation here described is a straightforward bone operation based on anatomy and simple mechanics. The only special instruments required in addition to the nail are the guide, the starter and the punch. A little angle-gauge is also useful.

The common practice of forbidding weight-bearing for some months after the operation while encouraging active movements of the hip is noted, and reasons are given for believing that early weight-bearing should be encouraged while movements of the hip should be prevented until bony union has taken place.

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PHYSIOLOGICAL EFFECTS OF BLAST

P. L. KROHN, B.M. OXFD
D. WHITTERIDGE,* B.M., B.SC. OXFD
S. ZUCKERMAN, D.SC. LOND., M.A. OXFD, M.R.C.S.

(*From the Departments of Human Anatomy and Physiology, Oxford. Work carried out for the Research and Experiments Department, Ministry of Home Security*)

THIS paper is one of a series of studies on the physiological effects of blast, carried out for the Ministry of Home Security. Previous published reports of this work have dealt mainly with the general character of the lesions caused, with their relation to lesions observed in air-raid casualties, and with the mode of their occurrence (Zuckerman 1940, 1941). The present paper is concerned both with the latter problem and with the effects blast has on the cardiovascular system, on the respiratory mechanism and on cortical activity. The way in which blast produces its effects on the body has been the subject of much speculation, and different views that have been put forward have been reviewed in our earlier reports. Of the other problems, the only one which, to our knowledge, has been studied experimentally is the influence of blast on arterial and venous pressure. This question was closely investigated by Hooker (1924), whose observations are referred to in the relevant section below.

METHODS

Animals.—75 rabbits, 2 monkeys and 2 cats were used in the present experiments. Clinical observations were also made on goats, guineapigs and mice. All animals in which any preliminary surgical procedures were carried out were anæsthetised with 'Nembutal' during the whole course of the experiment.

Method of exposure.—With a few exceptions mentioned below, the rabbits were restrained (without any covering of the trunk) by wire harness in a normal standing position, and were suspended in wire mesh cages from scaffolding, tail-on to a bare charge placed on the ground. Two rabbits were exposed (tail-on to the charge) after the thorax, and 1 after its abdomen, had been cased in plaster bandages. Seven rabbits were exposed head-on to the explosion in a closed steel cylinder with their heads projecting from a hole in one end. The animal's neck was rigidly held by plaster-of-paris bandages to a projecting "flange" around the hole, the fit between head and flange being air-tight. The cylinder, whose capacity was 15 litres, effectively resisted the blast of the charge.

Charge and method of measurement of blast-pressure.—The size of charge varied from 8 to 33 lb. polar ammon-gelignite and the distance of the animals from 6 to 14½ ft. In each experiment a piezoelectric gauge was placed immediately under the cage (or in the steel-box experiments immediately over the front of the box) to register the blast-pressure. The gauges were placed sideways to the explosion and thus recorded only the raised hydrostatic pressure. The animals were under direct observation within 15 sec. of the explosion.

Electrocardiographic records.—The field-laboratory and recording apparatus were 80 yards from the site of the explosions. Leads were taken from the trunk by silver-foil electrodes implanted under the skin of the right shoulder and left thigh. These electrodes were connected by shielded leads to an amplifier, cathode-ray tube and camera. This method has the advantage of robustness and sensitivity over the string-galvanometer, and was thus more suitable for the conditions under which the experiments were made. The time constant of the amplifier was 0·013 sec. A large potential fluctuation occurred at the moment of detonation. By reducing the amplification in steps before firing, and raising it immediately afterwards, full sensitivity of the amplifier was restored ½ to 1 sec. after the explosion. Thus in protected animals (see below) the record of the E.C.G. was completely unchanged 1 sec. after exposure.

Blood-pressure.—In 4 rabbits the arterial blood-pressure was studied by the carotid-loop method (Van Leersum 1911). The pressure in the loop could be measured accurately about a minute after the explosion. In 6 other rabbits the femoral or carotid artery was cannulated, and control pressure readings obtained by means of a mercury manometer. The animal was then removed from the apparatus and exposed to the explosion. Even in the most favourable circumstances there was an interval of about 4 min. after the explosion before the next series of readings. The venous pressure was obtained with a water manometer by cannulation of the central end of the jugular vein.

Respiratory mechanism.—Two silver wires, insulated except at their tips, were inserted into the xiphisternal slip of the diaphragm and tied in position. An earth electrode was sewn into the subcutaneous tissues of the abdominal wall. Insulation was not always complete and an electrocardiogram was often superimposed upon the record of the diaphragmatic action potentials. Records were also obtained of the total electrical activity in the vagus nerve in the neck. The perspex shielded-electrode of the Sherrington type which was used was firmly sewn down to the prevertebral muscles. The records obtained were not completely monophasic.

Cerebral activity.—The 2 cats and 2 monkeys used for this study were kept anæsthetised with repeated doses of nembutal for periods of up to 6 hours before exposure. Two stainless steel electrodes were screwed into the skull, so that they just touched but did not damage the dura mater. The scalp was closed over the electrodes, which were insulated from it as far as possible. In favourable circumstances the prolonged anæsthesia gave a fairly stable background of cortical activity in the form of a 10 per sec. rhythm of large amplitude against which alterations due to blast could be studied. The animals were exposed head-on to the charge. The time constant of the amplifier in these experiments was 1·2 sec.

Post-mortem examination.—All animals were autopsied immediately after death and selected tissues studied histologically. The findings were similar to those described in earlier papers (Zuckerman 1940, 1941). The characteristic lesions in the lungs and abdominal viscera are immediate in their onset, and have been observed within a minute after exposure to blast.

Results

MODE OF ACTION OF BLAST ON THE BODY

The view is still sometimes expressed that blast causes lesions in the lungs by "forcing its way" down the trachea. The opposite view that injuries resulting from blast are due to the direct impact of the wave on the body wall and not to blast acting through the upper respiratory tract was based primarily on the following considerations (Zuckerman 1940, 1941).

1. When animals are exposed sideways and close to small explosions, the lesions are unilateral and on the side facing the explosion. When placed further from the charge the lesions are bilateral. Presumably shielding occurs close to the explosion.

2. The disposition of lesions in the part of the lungs relating to the costo-mediastinal and phrenico-costal sinuses suggests that they are due to an external "blow."

3. Lesions occur in abdominal and other organs as well as in the lungs.

4. Animals exposed to low blast pressures close to a small explosion with their trunks clothed in thick sponge rubber suffer less severely than controls. Animals exposed near the explosion with only one side of the trunk covered in rubber,

* Beit Memorial Research Fellow.

and with the covered side facing the explosion, suffer no injury or only very slight injury to the lungs. When exposed with the uncovered side to the explosion, they suffer severe damage to the lung of that side, and less severe damage to the lung of the opposite side.

5. Rabbits were exposed head-on very close to a big charge in wooden boxes through which only their heads projected. In those cases in which the boxes were not badly crushed, pulmonary lesions were slight or absent.

Final confirmation of the view that blast affects the lungs not through the respiratory passages but through the body wall was obtained in 7 experiments in which rabbits were exposed in a steel cylinder head-on to the charge. In some experiments E.C.G. leads were taken in the usual way, and as a rule a piezo-gauge was also placed in the cylinder. A second gauge was placed immediately above the front of the cylinder. In one experiment the maximum hydrostatic pressure registered outside the cylinder (i.e., on the head) was 133 lb./sq. in., and inside 2 lb./sq. in. Since at the distance it was from the explosion the animal's head was also subjected to wind pressure, and also to reflections from the surface of the end of the cylinder, the effective pressure it experienced may be safely taken to have been at least twice the recorded pressure. This particular animal was dead when seen 15 sec. after the explosion. There were no lesions in the lungs and other thoracic or abdominal organs. Death was due to damage to the head. The contents of the middle ear were disrupted; there was blood in the nose, nasal sinuses and mouth; there was slight conjunctival hæmorrhage and considerable bleeding into the retrobulbar tissues. Although its neck was stretched by the explosion and its head was apparently displaced, no vertebral lesion was seen. Cerebral lesions were, however, encountered; there was subpial hæmorrhage over both olfactory lobes, and also slight bruising of the occipital lobes, presumably resulting from a movement of the head back on to the collar. The rest of the brain was normal.

In the 6 subsequent experiments of this type the meati were plugged and the ears padded with cotton-wool and strapped to the side of the cylinder. In one of these experiments the head was exposed to an effective pressure of almost 200 lb./sq. in. The animal was "conscious" when seen 15 sec. after the explosion. There was no blood in the mouth or nose. The respiratory rate was only slightly raised. Ten minutes after the explosion the heart-rate was too fast to be counted, but subsequently it fell to normal limits. Within an hour after the explosion the animal was walking round the room and eating food. It appeared completely normal. No lesions were found at autopsy. Of the remaining 5 animals, 3 sustained cervical fractures; 2 of the 3 were killed outright. The fractures were presumably caused by the head being violently bent against the neck-flange of the cylinder. Of the remaining 2 animals, 1 was killed outright. In none of the 5 animals were there thoracic or abdominal lesions. The only damage seen in the C.N.S. was subpial hæmorrhage over the olfactory bulbs and hæmorrhage in relation to the cervical fractures. No damage to the external or middle ear was seen in those animals whose ears were protected.

In all these experiments the pressures to which the animals' heads were subjected were well above the level at which it has been found that 50% of exposed but unprotected rabbits will be immediately killed as a result of visceral lesions. This level is for convenience referred to below as the P_{50} pressure. It can be safely concluded, therefore, that thoracic and abdominal lesions resulting from blast are not due to either the pressure or suction components of the wave acting through the upper respiratory passages, but that, on the contrary, blast exercises its effects on the surface of the body.

The suction component appears to have little or no effect in the production of lesions. Thus in the experiments referred to above, in which animals were exposed sideways and close to small explosions, the suction component was experienced all round the body, while the far side was shielded from the pressure component by the near side, which received all the injury. In another set of experiments, animals were exposed to a shock wave without a following suction component. Typical blast lesions were nevertheless caused. It is thus clear that the thoracic and abdominal lesions resulting from blast are due to the impact of the pressure component on the body wall. The experiments that have been carried out do not exclude the possibility that the lesions caused by the pressure component may be added to as a result of the body wall being pulled outwards by the suction component, which while relatively of very low pressure has a longer duration.

It is possible to restrict the effect of the impact of the blast wave on the body wall to the chest or the abdomen by protecting either part with plaster. The lesions in the part protected are usually minimal, while the unprotected region appears to be more severely damaged than usual.

Closure of the glottis is of no importance in the causation of the lesions. The latent period between stimulation of the animal by the arrival of the blast wave and closure of the glottis can hardly be less than 25 m. sec. The shock wave would in fact have passed long before the vocal cords could begin to close. It also seems immaterial, at least from the point of view of visceral lesions, whether the mouth is open or closed in an explosion, since no appreciable amount of air could travel up or down the trachea in the time intervals involved.

THE HEART

Rabbits exposed to blast pressures high enough to cause immediate death (2 to 3 times the P_{50} level) show a slowing of the heart-rate by 60–70% and diminution in the amplitude of the E.C.G. record, without any alteration in the coördination of the heart beat. This slowing persisted in vagotomised or atropinised animals exposed to similar high pressures and was absent in animals whose trunks were protected by the steel cylinder. This finding was first taken to indicate that the blast wave has a direct effect on the heart muscle. However, it was subsequently found in laboratory experiment that similar slowing occurs if the aorta and inferior vena cava of a rabbit are simultaneously severed in the abdomen. This procedure brings the circulation almost immediately to a standstill, and it seems likely that the slowing of the heart which was observed in those animals that had been exposed to very high pressures may have been at least partly due to an abrupt cessation of the circulation. Possible factors in such a circulatory standstill will be considered later.

Observations were also made on 15 rabbits exposed to pressures about the P_{50} level for this species; 6 of these animals survived the explosion. In these experiments, as in those in which animals were exposed to much higher pressures, no alteration was observed in the coördination of the beat, although short periods of alternation in the amplitude of the QRS complex and a few ventricular extrasystoles were occasionally observed. Only 2 of the 15 animals exposed to these lower pressures showed a slowing of more than 7%. The greatest immediate slowing observed in any animal was about 20%. Furthermore, no significant differences were observed in the amplitude of the E.C.G. record of these animals.

Essentially similar results were obtained from unanæsthetised rabbits with surface leads. Survivors frequently showed great acceleration of the heart-rate some 20 sec. after the explosion, possibly due to the liberation of adrenaline.

At autopsy all the above animals showed severe pulmonary bruising, occasional bruising (and sometimes rupture) of abdominal organs, retrobulbar hæmorrhage, and ruptured ear-drums.

In contrast to the minor changes in the E.C.G. in animals surviving exposure to blast, it may be noted that there are several clinical reports of abnormalities of the heart action following direct trauma to the chest wall (Barber 1940, Beck 1935).

BLOOD-PRESSURE

The arterial blood-pressure was always reduced within the range of blast pressures studied (half to twice the P_{50} value). The animals investigated may be divided into four groups.

The first consists of those which die within a minute or two of the explosion. No method of recording blood-pressure continuously was available and the only observation on pressure in this group of animals was obtained from one which had an exteriorised carotid artery. The pulse was palpable 30 sec. after the explosion, and had disappeared 30 sec. later. It made a transient reappearance 5 min. later.

The second group consists of animals which were not killed outright, but which died within half an hour. When the first records were taken after the explosion, the blood-pressure had dropped from the original level of 90 mm. Hg to 30–40 mm. Hg. The pressure remained at this low level until death occurred.

The third group comprises animals which survived exposure in spite of relatively severe internal lesions. Immediately after the explosion the blood-pressure dropped, and in one instance no pulse was palpable for about 4 min. (fig. 1). In these animals, however, the pressure recovered rapidly in the first 10 min. There was a slower and more prolonged rise towards the control level during the ensuing hour.

The fourth group consists of animals which showed a transient small drop in pressure. The normal blood-pressure was reached in about 30 min. or less.

An attempt was made to increase the systemic blood-pressure by increasing the venous return. If the abdomen of a normal animal is squeezed, there is a transient rise in systemic arterial blood-pressure, due presumably to increased venous return, followed by a slight fall mediated through the carotid sinus mechanism (de Waele and Van der Velde 1939). This effect was reproduced in 2 anæsthetised rabbits before exposure to blast. After exposure, compression of the abdomen, far from raising the systemic blood-pressure, led to a 25% fall. The pressure returned to its previous level in the ensuing minute. The fall in pressure is associated with a sharp rise in the respiratory rate, which persisted for half an hour (fig. 2). The experiment was carried out twice in each animal.

Adequate observations on venous pressure were obtained on only 1 rabbit, which showed a slight and continued fall in pressure after the explosion.

RESPIRATION

Rabbits which survive exposure to blast pressures in the region of the P_{50} level show a brief apnœa, followed by slow irregular and jerky breaths, which later give place to regular rapid and shallow respirations. During the apnœa, which lasts from 5 to 20 sec., there is a very large centripetal discharge in the vagus, which decreases after the first few sec. but remains 60–100% above the previous resting level (fig. 3). During the apnœa there is considerable maintained activity in the diaphragm, which implies a strong slow inspiratory effort (fig. 4). Short phasic discharges corresponding to individual breaths then become superimposed on the tonic discharge from the diaphragm. At first they are two to three

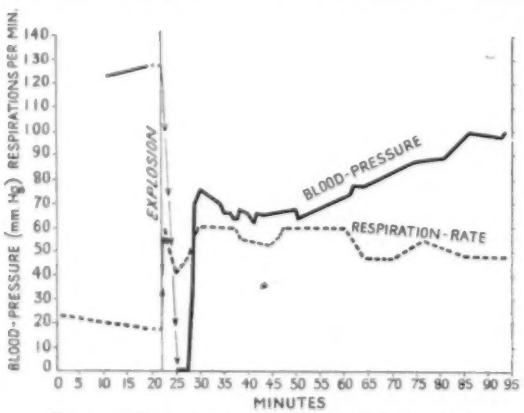

FIG. 1—Blood-pressure and respiration-rate of a rabbit (712) which survived exposure to a P_{50} pressure.

times as large as those of normal breaths, occur at irregular intervals and show a very sharp beginning and end. Gradual quickening may occur after 2 or 3 min. In fig. 4 the rate had risen after 7 min. from the normal level of 14 to 90 per min.

Rabbits which have been more severely affected die after a few minutes of slow, jerky respiration. It is unusual for an animal to die without making some inspiratory effort after the explosion.

In animals less severely affected the amplitude and duration of the maintained discharge in the diaphragm are less, and in some cases rapid breathing is established within 15–20 sec. (fig. 5). Animals in which lung damage was slight had respiration-rates of up to 200 per min. (i.e. about ten times the initial rate). With

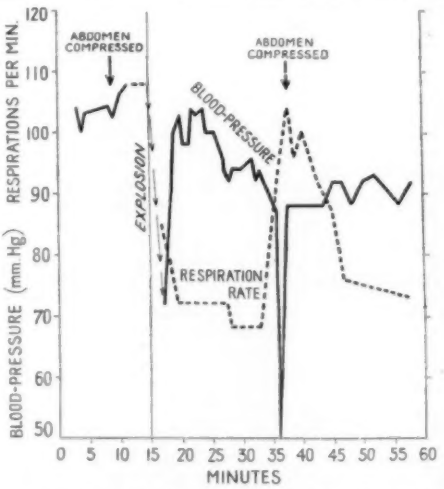

FIG. 2—Blood-pressure and respiration-rate of a rabbit (710) which died 2 hr. after exposure to a P_{50} pressure. The effects of compressing the abdomen before and after exposure are shown.

these high rates there is usually some tonic discharge between breaths, suggesting that the diaphragm fails to relax, and that the chest adopts an inspiratory position. The depth of respiration cannot be inferred from the height of the diaphragmatic action potentials, since the resistance opposed by the lung to expansion may change very greatly over the period recorded. The respiration-rate reaches a peak about half an hour after exposure and slowly declines over a number of hours. It may be still raised 24 hours after exposure. It was found in one experiment that the rapid breathing was stopped by double vagotomy and was replaced by normal deep vagal breathing. The animal (a rabbit) survived half an hour before it was killed and there was no sign of cyanosis before death. Direct observation suggested that the depth of respiration was sometimes greater than normal, and in these cases the total ventilation was probably greatly increased. An attempt to record total ventilation was unsuccessful.

Rapid breathing was observed in rabbits, cats, monkeys and goats. In severely affected mice, monkeys and goats another type of breathing was also seen. Breathing was slow, with an expiratory grunt, and sometimes a double expiratory movement occurred, consisting of passive relaxation followed after a short pause by a contraction of the abdominal muscles. In these animals severe lesions amounting to "hepatisation" of the lungs were found at autopsy. When the chest was opened the lungs failed to collapse.

This type of breathing was never observed in rabbits—a negative finding which may be related to the relatively weak abdominal muscles of these animals.

If pulmonary œdema should occur subsequently, as it sometimes does, the respirations become slower and deeper; the blood-pressure falls and signs of asphyxia appear.

CEREBRAL CORTEX

Attempts to detect abnormalities in the electrocorticogram several hours after exposure were unsuccessful. An attempt was therefore made to record from the cortex of 2 cats and 2 monkeys during exposure to blast. In the first cat the only abnormality recorded was a small depression of electrical activity from 14 to 17 sec. after the explosion. This was followed by temporary restoration of previous activity, although the animal had suffered severe pulmonary damage and died 14 min. later. The record of the second cat was normal when it was first readable 5 sec. after the explosion; 5 sec. later, however, cortical activity almost disappeared. It

FIG. 3—Records of increased centripetal activity in the vagus trunk of a rabbit (721) which died 2 min. after exposure to a P_{ss} pressure. The amplification is reduced at A and raised at C. The explosion occurred at B. (Intervals on scale here and in subsequent figures = 1 sec.)

returned after a further 12 sec. and was apparently normal after another 11 sec. An attempt was made to imitate this effect by squeezing the vertebral arteries; 32 min. after the explosion this produced an immediate decrease of activity; 36 min. after the explosion depression of activity began 3 sec. after vertebral compression and passed off 7 sec. after the compression was released. In a normal animal anæmia produces a decrease of cortical activity in 8–10 sec. (Gerard and Sugar 1938).

The electrocorticogram of one rhesus monkey showed no change either when the record was first readable 20 sec. after the explosion, or later, but that of a second monkey was similar to the record of the second cat. This monkey showed a well-developed α discharge of 9–11 cycles per sec. due to the nembutal (fig. 6*a*), with occasional large waves at 2 per sec.; 23 sec. after the explosion a small burst of α waves at 9 per sec. was visible. No further α waves were visible until 7 min. later, but during this interval the slow waves had become larger and more frequent (fig. 6*b*). With the reappearance of the α waves the larger slow waves disappeared, and half an hour later the record became normal. Afterwards the blood-pressure began to fall gradually, and the α rate increased to 14–16 per sec. Asphyxial convulsions occurred 1 hr. 40 min. after the explosion.

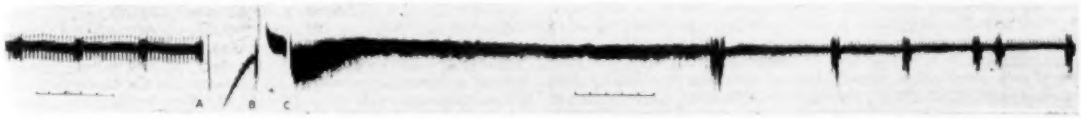

FIG. 4—Record of diaphragmatic action potentials in a rabbit (731) which survived exposure to a P_{ss} pressure. An E.C.G. is superimposed on the tonic diaphragmatic activity before the explosion.

Discussion

The field conditions under which the work had to be carried out imposed certain limitations on the investigation. In general the fact that records had to be taken 80 yd. from the site of the explosion meant that only changes which had an electrical sign could be measured continuously, while records of blood-pressure could not be made for some minutes before and after the explosion. Again, only one amplifier channel was available, and consequently it was impossible, for example, to take simultaneous records of activity in the vagus and diaphragm. The resources of the improvised field laboratory were also inadequate for full analysis of the respiratory changes. Nevertheless, a coherent picture of the physiological changes which result from blast has been obtained.

FIG. 5—Record of diaphragmatic action potentials in a rabbit (733) which survived exposure to a pressure below the P_{ss} level. The displacement of the base-line after the explosion is due to a movement artefact.

EFFECTS ON THE HEART

The electrocardiographic experiments were undertaken to test the possibility that the immediate cause of death in animals killed outright by blast is ventricular fibrillation. In fact, as the records show, there appears to be no lack of coördination of the heart-beat in blasted animals. The time of onset of changes in the E.C.G. of rabbits whose circulation is arrested has been checked in laboratory experiments. When the circulation is suddenly arrested no change occurs for 2 min. The first visible change is a "high take-off" to the T wave; this is followed about 1 min. later by an increase in the P–R interval. In animals which are killed outright by blast the same changes occur in the form of the E.C.G. at the same intervals after the explosion, a fact which suggests an immediate arrest of the circulation. Severe but transitory anoxæmia of the heart may also occur in animals which survive exposure to blast. Thus in one animal no change in the P–R interval occurred for 2–3 min. after the explosion. It increased by 20% at 5 min. and returned to normal at 10 min.

It may be noted that small hæmorrhages have occasionally been seen both in the pericardium and epicardium of animals killed by blast (Zuckerman 1941).

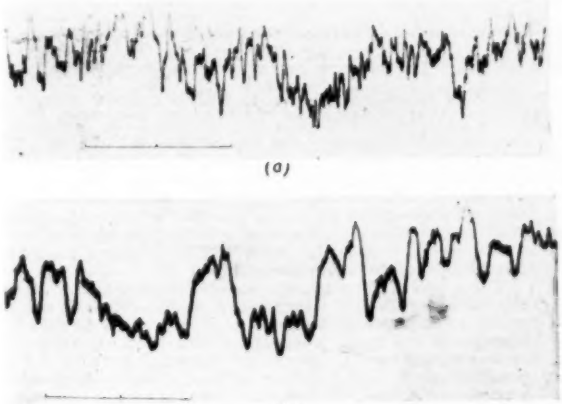

FIG. 6—Electrocorticogram of a monkey (737) which survived exposure head-on to a P_{ss} pressure: (*a*) before the explosion; (*b*) 2 min. after.

EFFECTS ON BLOOD-PRESSURE

Animals exposed to explosions show an immediate fall in arterial blood-pressure, which in extent and duration bears a relation to the peak blast pressure experienced. Observations on venous pressure were, as noted, limited to a single animal in which the first observation was made 18 min. after the explosion. Although the respiratory rate was seven times the normal, the venous pressure of this animal showed a slight and maintained fall after the explosion. It is clear, therefore, that the respiratory acceleration was not due to raised venous pressure (cf. Harrison 1939).

Falls in the blood-pressure of dogs were observed by Hooker (1924) in his study of shock resulting from gun-blast and the blast from high explosive. He did not note the profound immediate fall in arterial pressure observed in the present study, presumably because his earliest observation was never made sooner than 7 min. after exposure and often not before half an hour had passed.

Maintained falls as profound as those he observed in dogs were noted in only 1 of 7 rabbits in our experiments. On the other hand, our single observation on venous pressure agrees with those of Hooker in demonstrating a slight maintained fall.

Similar falls in blood-pressure can be produced by vagal inhibition of the heart and by peripheral vasodilatation, as for example in the subconcussive states described by Denny-Brown and Ritchie Russell (1941). We have, however, never seen any evidence of a vagal slowing of the heart except in animals in which damage has occurred to cervical vertebræ. In vagal slowing there is some reduction in P–R interval corresponding to a shift of the pacemaker, often nodal rhythm, and usually some irregularity due to escape from the vagal control. When slowing of the heart has been observed in blasted animals, before the effects of anoxæmia supervene, there has been slight decrease of the P–R interval, never nodal rhythm, and perfect regularity. If "primary nervous shock" occurs in such animals, it must depend on peripheral vasodilatation almost entirely without any vagal inhibition of the heart—unlike the condition described by Denny-Brown and Ritchie Russell.

Furthermore, it should be noted that rabbits show an immediate fall in blood-pressure when exposed to high blast pressures with either their chest or their abdomen completely protected by a close-fitting plaster jacket. In the former case the lungs, in the latter the abdominal viscera, show minimal lesions, whereas the unprotected viscera in each case are very severely damaged. It is evident, therefore, that either pulmonary or extrapulmonary trauma can cause an immediate drop in blood-pressure, and clearly both factors may operate in an unprotected animal exposed to blast. It is significant that one anæsthetised animal exposed with its chest protected by plaster survived in spite of severe abdominal lesions and severe "shock" which persisted until it was killed three-quarters of an hour after the explosion. This observation is in accordance with the general conclusion from all our experiments that death or survival are more closely correlated with the severity of the lung lesions than with damage to any other tissues.

It seemed likely that changes in the systemic blood-pressure could be explained as being chiefly secondary to changes in the pulmonary arterial pressure, which the circumstances of the experiments did not allow of measurement. It is safe to assume that the pulmonary blood-pressure is raised in blasted animals in the presence of pulmonary œdema. Observations which suggest that this is so are the frequent occurrence of right-sided dilatation and bilateral hydrothorax in terminal conditions associated with pulmonary œdema. The state of the pulmonary blood-pressure is not so obvious in animals with signs of respiratory "distress" unassociated with œdema. In such animals the systemic blood-pressure is not more than 10–20 mm. Hg below its normal value; the venous pressure is not raised; there is apparently no anoxæmia; but the respiratory rate is 5–10 times the initial value.

Experimental obstruction of the pulmonary circuit can result in a somewhat similar picture. Slow constriction of the pulmonary artery may produce a low systemic pressure, but is always accompanied by a rise in the venous pressure (Gibbon, Hopkinson and Churchill 1932). A far more remarkable parallel is provided by Shaw Dunn's observations on the effect of intravenously-injected starch granules in goats (1919), and in the similar experiments on dogs carried out by Binger, Boyd, and Moore (1927). In both cases the respiration-rate rose to 6–10 times the resting rate. An immediate transient rise in the venous, and fall in the arterial, pressure occurred in these animals. In animals which survived this treatment for some hours the subsequent venous and arterial pressure was little different from normal. The circulation-rate, the right ventricular pressure and the arterial CO_2 and O_2 levels were also not consistently affected. The X-ray shadow of the right pulmonary artery was increased. At autopsy the majority of pulmonary arterioles were found to be occluded by starch granules. This will have a similar effect in reducing the available pulmonary vascular bed as the exclusion of zones of the lung by the trauma produced by blast.

The number of capillaries in use in the lungs in a normal animal at rest is only a small fraction of the total. Wearn and others (1934) have estimated that the number through which blood flows at a given moment varies from $\frac{1}{10}$ to $\frac{1}{15}$ of the total number of capillaries in each alveolus. The effect of the large reserve capacity is that the lung can normally accommodate very different volumes of blood with a minimal change in pulmonary arterial pressure. The clinical importance of this factor has been stressed by Brenner (1935). The trauma due to blast, like the blocking of arterioles with starch granules, reduces the total available capillary bed. Consequently the extent to which the pulmonary flow can increase without resulting in a rise of pulmonary blood-pressure sufficient to produce pulmonary œdema will be reduced. When the available capillary bed is just sufficient to accommodate the resting venous return there would be no serious rise in pulmonary blood-pressure at rest. Any increase in venous return would, however, in such conditions, produce a sharp rise. This is presumably what happened in the two blasted rabbits whose abdomens were compressed. In these animals the systemic blood-pressure fell sharply and the respiration-rate rose, changes which Schwiegk (1935) and Daly and others (1937) have shown by direct methods to follow the raising of the pulmonary blood-pressure. A similar mechanism in cardiac asthma has been suggested by Christie (1938).

Should the available capillary bed become insufficient even for the resting venous return, the pulmonary pressure would rise to the level at which pulmonary œdema occurs. In fact, 1 of the 2 animals referred to above died from pulmonary œdema an hour after the effect of increasing the venous return was tested. It is possible that there is a progressive reduction in capillary capacity due to continued hæmorrhage in the lung substance, as has been reported in human beings (Hadfield 1941).

Other factors—for example, local chemical changes affecting pulmonary capillary permeability—probably assist in the production of pulmonary œdema in blasted animals.

EFFECTS ON RESPIRATION

The rise in the respiratory rate, which can be immediate in its onset, may be, as already observed, up to ten times the rate before exposure to blast. It was also observed by Hooker (1924) in dogs. Acceleration of respiration, with increased tonic discharge in the diaphragm, is also produced in rabbits either by suction of air from the trachea or by compression of the chest (Head 1889). Both procedures lead to a large maintained contraction of the diaphragm, followed by rapid breathing. Repetition of these experiments, with records of action potentials in the xiphisternal slip of the diaphragm as in the blast experiments, showed that

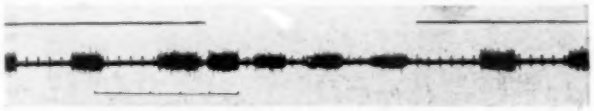

FIG. 7—Record of diaphragmatic action potentials of a rabbit. Break in the signal line indicated a period of compression of the chest.

the respiration-rate may be almost doubled (fig. 7). In such experiments the acceleration is limited to the period of deflation of the lungs. It is certain that the positive component of the blast wave is responsible for the visceral lesions due to blast, and the inference is that the impact of the wave results in compression of the chest, which is probably sufficient to produce massive stimulation of the deflation endings.

The respiratory rate is raised for several hours after the explosion (e.g., 24 hours in a goat). The following evidence suggests that this persisting increase is due to changes in the lungs (e.g., hæmorrhages into the alveoli and alveolar walls, spread of blood into atria and possibly atelectasis) rather than to changes in the respiratory centre.

Since the work of Adrian (1933), it is generally accepted that the increased inspiratory effort following compression of or suction of the air from the chest in rabbits

is due to stimulation of "deflation" nerve-endings in the lung.† These deflation endings are stimulated by extreme degrees of collapse of the lungs. By far the larger number of afferent endings in the lungs, however, are stimulated by inflation. Their frequency of response normally varies with the change in volume of the thoracic cavity, and they inhibit diaphragmatic tone and inspiratory effort. In animals exposed to high blast pressures there is always a very large immediate increase in diaphragmatic discharge. The increased afferent activity which has also been observed in the vagus of such animals is thus presumably accompanied by a maintained contraction of the diaphragm. This could only occur if the afferent impulses in the vagus came chiefly from deflation endings. Presumably these are stimulated not only, as suggested above, by the direct effects of the blast wave, but also partly as a result of the development of hæmorrhages.

Increased diaphragmatic tone is also present between breaths in rapid and shallow breathing, which may begin as soon as 16 sec. after exposure (fig. 5). It is probable that the rapid shallow breathing is due to the cutting short of the inspiratory phase, and there is reason to believe that when hæmorrhagic changes have occurred in the lungs, the stretch receptors respond to a given expansion of the chest by a higher rate of discharge than normal. Thus in a parallel case Partridge (1935) found that an ending which responded to a given expansion by 60 impulses per sec. discharged at 100 per sec. after the production of starch emboli, and that endings which were previously inactive also began to discharge. Adrian (1933) has shown that these stretch receptors are remarkably difficult to stimulate except by deformation of the lung tissue. It is therefore probable that the increased discharge observed by Partridge was due to a greater deformation of the particular ending under investigation. Summarising these considerations, it thus appears that damage to the lungs such as is observed after blast or the production of starch emboli results in an increased inspiratory effort due to stimulation of deflation endings, and increased sensitivity of stretch endings to expansion of the lung. The summation of these effects could account for the observed immense increase in respiratory rate.

The respiratory changes produced by blast can be closely imitated by injecting saline into the trachea of dogs (Harrison 1932). After a short apnœa, respiration in such animals becomes very rapid and shallow. Double vagotomy reduces the respiration-rate to the usual level. This procedure also reduced the respiratory rate when it had been quadrupled as a result of exposure to blast. Neither of these experiments by itself provides conclusive evidence of the rôle the vagal afferent impulses play in the production of rapid shallow breathing, since, as Binger, Brow, and Branch (1924) showed, double vagotomy will also abolish the respiratory acceleration produced by asphyxia of the respiratory centre.

Since the work of Davis, Haldane and Priestley (1920), rapid shallow breathing has been taken as a sign of "fatigue" of the respiratory centre, which is accentuated by slight degrees of asphyxia. This cannot be its only explanation, for rapid breathing can begin as soon as 16 sec. after exposure to blast, and we have never seen any signs of asphyxia except in the terminal condition of pulmonary œdema. Furthermore, the arterial blood was fully saturated with oxygen in the only one of our blasted animals in which it was measured, while periodic breathing, which is regarded as a sign of oxygen lack, has never been seen in these animals.

The possibility that the impact of the blast wave on the medullary centres may be responsible for the rapid shallow breathing can be ruled out completely, since animals in which the head only is exposed to blast—while the chest is protected—show no respiratory acceleration whatever.

It can therefore be concluded that rapid and shallow breathing is related directly to the characteristic changes produced in the lung by blast. It reaches its greatest heights with moderate degrees of injury and does not indicate "shock" or anoxæmia of the respiratory centre.

† The work of Partridge (1939) suggests that these "deflation endings" may in fact be proprioceptive fibres from the pulmonary blood-vessels.

When the lung is so severely damaged that whole lobes are completely consolidated, the type of respiration is quite different. At autopsy the lungs fail to collapse. There must therefore be an increase in lung viscous resistance (cf. Bayliss and Robertson 1939) which opposes inspiration and expiration. The elastic recoil of the lungs is no longer sufficient to bring about deflation and the accessory muscles come into play. As is observed, grunting and very laboured expiration take place. The resistance to inspiration must hinder expansion of the chest so that there is less stimulation of stretch endings. Inspiration will continue for a longer time and the respiration will be laboured and slow.

EFFECTS ON THE CEREBRAL CORTEX

The effects produced by blast are quite different from those due to a direct blow on the head, which have been studied by Williams and Denny-Brown (1942). In cats anæsthetised with nembutal, all cortical activity under the electrodes is immediately abolished by the blow. Electrical activity reappears after about 3 min. and later slow regular waves appear which are reminiscent of δ waves in human concussion (Williams 1941). The essential difference is that animals exposed to blast show normal cortical activity for 10–20 sec. after the explosion. The subsequent disappearance of activity cannot be due to the impact of the blast wave but must be some secondary effect induced by it.

The four animals whose electrocorticograms were recorded were exposed to pressures high enough to cause death; the animals died in ¼–1¼ hours. Even when exposed to pressures three to four times as high, animals with their heads directly facing the explosion but with their trunks in a steel box were not concussed. For example, one such animal at no time lost "consciousness" or its corneal reflex, and was capable of coördinated activity immediately on release. The fact that concussion does not occur as a result of the impact of the blast wave is confirmed in cases of human beings who have been exposed to pressures in the region of the estimated human P_{50} (50% lethal pressure) without suffering retrograde amnesia or unconsciousness. Reports of feeling "dazed" after an explosion are remarkably common compared to the rarity of histories of retrograde amnesia. One of the factors involved may be a cortical anoxæmia due to the circulatory changes discussed above. It may be noted that concussion, when it is not due to a crushing blow, is believed by Denny-Brown and Ritchie Russell to result from sudden linear acceleration of the head, the necessary threshold velocity of a heavy hammer striking the head of a monkey or cat being about 28 ft. per sec. It can be calculated that the required velocity would not be produced by blast except in the immediate neighbourhood of an explosion where the pressures are higher than any that have been referred to above.

Histological observation of the cortex of monkeys killed outright by blast show no visible lesions (see Zuckerman 1941, Leach 1942).

CAUSES OF DEATH

There are a number of ways of being killed by blast, of which total disintegration of the body is the extreme case met with very close to an explosion. Those animals which are immediately killed without external injury presumably die from that undefined entity known as "primary shock" resulting from extensive visceral lesions. Some animals in this group have the trachea or main bronchi completely blocked by solid blood-clot. Whatever other factors may have contributed to their deaths, further air-entry would have been impossible. Most animals which have died more than a short interval after exposure usually had blood-stained froth in their mouth and nose and have died of pulmonary œdema. Others die because of continued hæmorrhage due to damage to an abdominal organ. Hæmorrhage into the ventricles of the brain has occasionally been observed in rabbits but not in other species. The other changes that have been observed in the nervous system are so slight that they can hardly be regarded as fatal. No direct fatal interference with cardiac function has been observed.

CLINICAL IMPLICATIONS

It is tentatively suggested that the physiological changes described above, being common to a number of

species, also apply to man, and that they lead to certain conclusions, of which some are suggested below, about the management of injuries to the lungs due to blast, and of corresponding injuries, unassociated with open chest wounds and not directly due to blast, which are sometimes seen in air-raid casualties.

A moderate or severe degree of pulmonary blast injury may be associated with symptoms of tightness in the chest, difficulty in drawing a deep breath, and the feeling of having been "kicked in the stomach." These symptoms are related to an overactive Hering-Breuer reflex. In the presence of other injuries they may be inconspicuous, and diagnosis may have to depend primarily on the rate and character of the respiration and on collateral symptoms and signs. Ruptured ear-drums and pain in the ears are probably the more important of the latter, among which may be included for convenience a clear history of the incident—if it can be obtained. All published clinical reports speak of dyspnœa as a prominent symptom, but give little information of its nature. On the basis of our animal experiments, rapid shallow breathing or slow breathing with laboured expiration are to be expected. The latter is related in animal experiments to increased lung viscosity, which opposes the elastic recoil of the lungs and prevents the normal ascent of the diaphragm—a condition which occurs in "idiopathic" emphysema (Christie 1934), where collapse of the lung is prevented by absence of elasticity. It may account for the ballooning of the lower part of the chest that has been observed in human beings who have suffered from the effects of blast (Dean, Thomas and Allison 1940, O'Reilly and Gloyne 1941).

If our inferences on the state of the pulmonary circulation are correct, such patients have a greatly reduced pulmonary capillary reserve. Any increase in venous return or pulmonary congestion is liable to produce pulmonary œdema and collapse, a fact which gives strong support to the suggestion that general anæsthesia or blood-transfusion are contra-indicated in this condition (*Lancet*, 1940, ii, 426). Symptomless cases may, by exerting themselves, increase the pulmonary blood-pressure to dangerous levels.

The observation that venesection may be beneficial in such conditions (O'Reilly and Gloyne 1941) also accords with the picture of the state of the pulmonary circulation that has been described above. Rational treatment for slow breathing with laboured expiration, where the lung viscosity is increased, would seem to be the administration of oxygen. Where the respiratory rate is increased, and the breathing is rapid and shallow, there is the danger of partial anoxæmia (Haldane and Priestley 1935). In such cases, oxygen to prevent anoxæmia, and morphia to decrease the respiratory rate without increasing its depth, would seem to be indicated. For obvious reasons CO_2 would seem to be contra-indicated.

Summary

A series of experiments in which rabbits' trunks were protected while their heads were directly exposed to high blast pressures has confirmed earlier observations that thoracic and abdominal lesions resulting from blast are due to the wave acting on the surface of the body and not to either the pressure or the suction components of the wave acting through the nose and mouth. The thoracic and abdominal lesions are primarily due to the impact of the pressure component on the body wall and the lesions can occur when the suction component is excluded.

Electrocardiographic records show that there is no lack of coördination of the heart beat in blasted animals, although anæsthetised animals exposed to pressures high enough to cause immediate death may show a slowing of the heart-rate by 60–70% and a diminution in the amplitude of the record. Similar findings have been observed if the circulation is stopped by severing the abdominal aorta and inferior vena cava. The electrocardiogram of animals which survive exposure to high blast pressures may show evidence of a transitory phase of anoxæmia. Only slight slowing of the heart occurs in anæsthetised animals which survive, while the rate in unanæsthetised animals is frequently accelerated.

Animals exposed to blast show an immediate fall in arterial blood-pressure, which in extent and duration is related to the peak blast pressure experienced. There is a slight maintained fall, as found by Hooker, in venous pressure. These "shock" symptoms are not due to vagal inhibition.

While the falls in pressure can be regarded as being partly a "shock" effect of pulmonary or extrapulmonary trauma, it seems that changes in the systemic blood-pressure can be explained as being chiefly secondary to changes in the pulmonary blood flow.

The condition of the pulmonary circulation in severely blasted animals can be paralleled in animals which have received intravenous injections of starch. In both the extent of the reserve capillary bed is reduced, and the danger of a rise in the pulmonary arterial pressure and of pulmonary œdema as a result of increased venous return made greater.

There is usually a prolonged and great increase in the respiratory rate of rabbits which survive exposure to blast. This appears to be due to stimulation of deflation endings and increased sensitivity of stretch endings to expansion of the lung, and not to chemical changes affecting the respiratory centre or to any direct effect of blast on the medulla. When the lung is so severely damaged that whole lobes are consolidated, respiration is very laboured, because of changes in the elastic recoil of the lungs.

Animals exposed to high blast pressures are not concussed. Electrocorticogram records as a rule either show no change or changes which can be related to cortical anoxæmia resulting from general circulatory changes.

Possible ways in which blast may cause death are considered. Immediate death unassociated with external trauma appears to be due to "shock" following internal injury. This condition is sometimes associated with occlusion of the larger air-passages by blood-clot. Delayed death is as a rule due to pulmonary œdema and more rarely to intraperitoneal hæmorrhage.

Certain clinical implications are also discussed. The crucial points in the diagnosis of "blast" when signs of pulmonary or abdominal damage exist are an accurate history of the circumstances of the injury and the state of the ear-drums and middle ear. Rapid shallow breathing or slow laboured breathing may be expected. Treatment should be directed to avoid overtaxing an already diminished pulmonary capillary reserve. Oxygen, morphia and venesection may be beneficial, while transfusion, general anæsthesia and exertion are contra-indicated.

We should like to express our thanks to the Chief Adviser and officials of the Research and Experiments Department of the Ministry of Home Security, and to the Director and officials of the Road Research Laboratory for help given us in these investigations. We are also grateful to Sir Thomas Lewis for his opinion on the electrocardiographic records and for his advice about the general problem; to Mr. E. H. Leach for his coöperation in the study of the histological changes in the nervous system; to Dr. G. M. Brown for preparing the carotid-loop animals; and to Mr. F. Etty for his technical assistance.

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INCIDENCE OF PERFORATED PEPTIC ULCER

EFFECT OF HEAVY AIR-RAIDS

D. N. STEWART D. M. DE R. WINSER
STUDENTS AT CHARING CROSS HOSPITAL

SHORTLY after the beginning of the second week in September, 1940, when serious raiding on London began, 7 patients with perforated peptic ulcers were admitted within a few days to Charing Cross Hospital, which normally admits 1 a month. To discover whether this increase was more than a chance one we approached eighteen other London hospitals, and asked to examine their records from 1937 to 1940. Of these hospitals we visited all but three—at one permission was not granted, another enjoyed a large increase in beds during the period, so that its figures were useless for comparison, and the third was bombed and put out of action in these raids. The remainder, though they were selected at random, or often because of some personal kindness, were well-distributed: 2 in the centre of London, 1 north, 2 north-east, 1 east, 4 south-east, 2 south, 1 south-west and 3 west.

The control period, from January, 1937, to August, 1940, seems to be adequate. Until recently there has been no satisfactory control period since the raids of September–October, 1940, for there was a long period of single raids of considerable violence. On the whole the experiment was loaded against any absolute increase of perforations in September–October, 1940, because the population of London was then at its lowest, total hospital admissions being lower still. But the fact that one of the eighteen hospitals was put out of action in the raids suggests that some part of the increase may have been due to a transfer of emergencies to the hospitals still in action. Without having any figures, we believe that this was not an important cause, since most hospitals, even when hit, were able to keep open for emergency work. Of the sixteen whose figures we have used, one was out of action from the middle of October, 1940, onwards, and more than half were hit. Moreover, this cause should still have been operating in November and December, 1940, neither of which months shows much increase in perforations over the control period; November was particularly low.

The results are shown in fig. 1. The rise in September-October, 1940, is obvious. The monthly average for the four years is 25; excluding September and October, 1940, it is 23; whereas in these two months it was 64. The mean standard deviation, excluding September and October, is 6; including them, 10. The September increase is more than four times the mean standard deviation; the October increase, though smaller, is also considerably more than twice the standard deviation, so that both rises were statistically significant. Of the total of 1177 perforations, 100, in 1937 and 1938, could not be dated, and these were averaged over the months, thus making the significance of the peaks in July, 1938, and December, 1937, harder to evaluate. As they stand, these peaks are barely statistically significant; they certainly do not rival the rise of September–October, 1940.*

CAUSE OF THE RISE

The only recorded parallel to this increase which we could find is reported by Hamperl,[1] who found that perforations became at least ten times as common during a famine period in Russia. In an attempt to discover possible causes for such increases we collected a list of suggested ætiologies for peptic ulceration, on the assumption that factors that favour ulceration also favour perforation. On this subject von Redwitz and Fuss [2] wrote 387 pages, but the possible ætiologies may be summarised under certain headings: acidity, vascular changes, miscellaneous drugs, trauma, bacteria and nervous stress.

The summaries of Mann [3] and McCann [4] leave little doubt that high or prolonged acidity and the blockage of small arteries can cause ulceration. But clearly neither of these factors was overactive in the September–October, 1940, period without some previous cause, possibly nervous; we cannot assume an idiopathic alteration in gastric or vascular function.

There was probably no increase in the use of causative drugs (which include mercury, cantharides, vegetable alkaloids, chloroform, certain hypnotics, magnesium and copper sulphate) except in the case of alcohol and nicotine, and there is no evidence that trauma, which was of course common in the blitz period, played a part in precipitating these perforations. Hard food, however, has been a cause of traumatic perforation and failure to heal in animals (McCann,[4] Ivy and Fauley [5]), when it came on top of a previously produced ulcer. Hastily swallowed meals, and an increased consumption of tobacco and alcohol may thus all have helped in causing the increase.

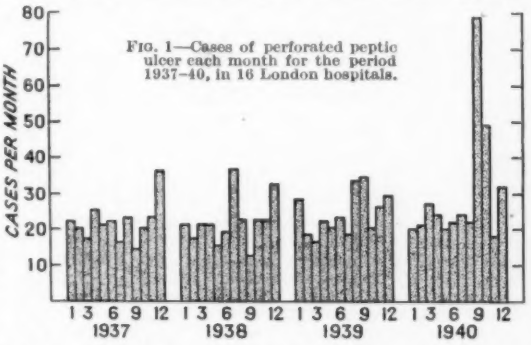

FIG. 1—Cases of perforated peptic ulcer each month for the period 1937–40, in 16 London hospitals.

The bacterial view of the causation of peptic ulcer, supported by Rosenow,[6] has at one time or another incriminated diseases of the heart, lungs, intestines, gall-bladder, fallopian tubes, meninges, teeth, prostate and tonsils, as well as ten different bacteria. There is also support for an infective cause of ulceration in Einhorn's [7] statement that 50% of his recurrences dated from common colds. In the period of the raids shelter life began, and an infective factor would have had good opportunities to operate; but Lord Horder has stated that in those times the country's health was particularly good, and there was a drop in November and December, when the shelters were as well patronised as ever. Einhorn noted a seasonal fluctuation; what other evidence there is for this [8-15 42] is in favour of a small increase in perforations in autumn and spring; for example, of the 2630 cases of perforation collected by Eliason and Ebeling,[15] 32·4% occurred in October, November and December.

There remains the possibility of a nervous cause. Cushing [16] and McSwiney [17] have reviewed the effects of section and stimulation of the vagus and sympathetics. The results contrast greatly with the known effects of emotion described by Cannon and Alvarez. (Hinds-Howell [18] recently reported that the effect of an air-raid warning on test-meal readings was "extraordinary," though he gives no details.) It has been suggested that, in view of their frequent anastomoses, neither the vagus nor the sympathetics contain pure parasympathetic or sympathetic fibres. And following Schiff and Rokitansky, or more often Cushing,[16] many workers studied the effects of stimulation and trauma of the higher centres. We have seen 14 papers recording short series of perforations following brain-surgery; and

* The increase in deaths from peptic ulcer during the second year of the war is shown by the Registrar-General's figures to have been 28% for men and 22% for women (*Lancet*, 1942, i, 189). The greatest number of deaths, however, occurred in January–June, 1941, even though July–December, 1940 showed a 20% increase on July–December, 1939.

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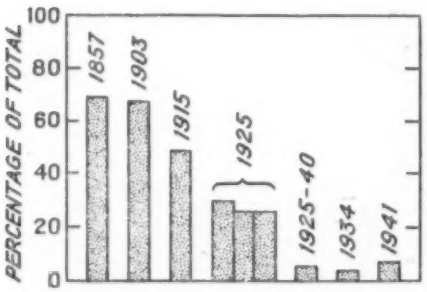

FIG. 2—Female cases of perforated ulcer as a percentage of total cases, in recorded series. 1857, Brinton [40] (230 cases). 1903, Brünner [11] (361 cases). 1915, Schoemaker [43] (244 cases). 1925, Schwarz [44] (180 cases); others quoted by Schwarz (551 cases; Bager [14] (1500 cases). 1925–40, miscellaneous authors [12-14 29-35 37-40 44 45] (2581 cases). 1934, Eliason and Ebeling [13] (2630 cases). 1941, present series (1055 cases).

Sheehan [39] has summarised the work done on the effect of damage to the hypothalamus. After Beattie [30] had demonstrated a parasympathetic, and possibly a sympathetic, hypothalamic centre, Fulton, Keller, Sheehan, Hoff, Watts and others showed that hypothalamic damage produced gastro-intestinal disorders in 25% of cases; damage elsewhere in the central nervous system rarely caused such disorders, and in normal animals they are very rare indeed. These disorders included ulceration and perforation, but also such phenomena as ulceration and bleeding as high as the mouth.

Clinically a nervous factor in precipitating both ulceration and perforation has been confirmed by Davies and Wilson [31]; they were able to show that 80% of ulcers, relapses, hæmatemeses and perforations followed a definite period of anxiety. In 100 hernia controls such anxiety only preceded the lesion in 20%. Emery and Monroe,[32] in an uncontrolled survey, stated that among 1279 ulcer patients, in 334 fatigue and in 258 emotion and worry seemed to be the main predisposing factors. These four workers seem to have put on a sound statistical basis the views which appear in the anthropometrical studies of Draper and Touraine [33] and the psychological studies of Franz Alexander and his co-workers.[34] And these workers in turn agree with the expressed views of all the authorities we could consult: that anxiety and an over-conscientious and intense mental outlook predispose to ulceration and presumably to perforation as well. The earliest mention of such a view that we have found is by Heberden.[35]

It seems, therefore, that the possible causes of the September-October increase, and also of Hamperl's Russian figures, are: (*a*) anxiety; (*b*) dietetic difficulties; (*c*) increased smoking and drinking; (*d*) an improbable increase in bacterial infection.

Smoking and drinking increase partly as a result of anxiety, and there seems to be renewed justification for Alvarez's quotation from Proverbs, I, 17: "Better is a dry morsel and quietness therewith than a house full of feasting and strife."

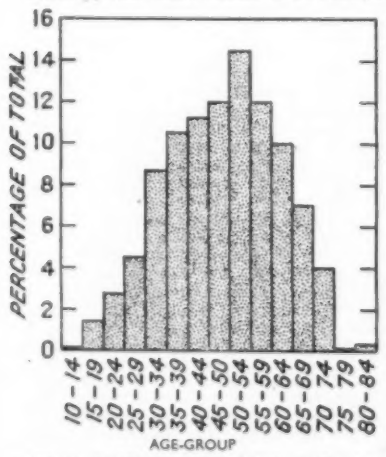

FIG. 3—Incidence of perforated peptic ulcer in present series in five-year age-groups.

AGE AND SEX-INCIDENCE

We collected data on the age, sex and site of perforation in most of these cases. The proportion between gastric and duodenal perforations varied so much from one hospital to another (between 9 to 1 and 1 to 9) that it seemed that not all the many operators were concerned with this point. There are also wide variations in the literature; Gilmour and Saint [38] in Britain record only 4% of perforations as gastric, against Meyer's [34] 80% in the United States. Nicol [36] has lately shown that, judged from hospital records, the proportion of duodenal to gastric ulcers is 1·2 : 1 in London; 4·4 : 1 in Leeds; and 11·6 : 1 in Scotland. He points out that there is a large excess of duodenal over gastric ulcers all over the world except in London. Our figures for perforations in London (see table) show a fairly constant gastric: duodenal ratio over the four-year period, with a slight rise in the proportion of gastric cases in the blitz period over the rest of 1940.

SITE OF PERFORATION IN 897 CASES RECORDED IN THE RECORDS OF LONDON HOSPITALS

Date	Gastric		Duodenal		Ratio G : D
	No.	Av. age	No.	Av. age	
1937	123	45·9	81	48·2	1·52 : 1
1938	141	48·1	67	49·3	2·10 : 1
1939	136	50·6	91	48·3	1·49 : 1
1940 (exc. Sept. Oct.) ..	92	48·4	74	46·3	1·24 : 1
1940, Sept., Oct.	62	51·9	30	44·5	2·06 : 1
Total ..	554	49	343	46·9	1·61 : 1

Of 1055 perforations in our series, only 7% were in females. Jennings [45] has pointed out the remarkable way in which young women have ceased to perforate and to ulcerate. In Brünner's [11] 1903 figures, which are confirmed by Brinton's figures of 1857 (Jennings [45]), 171 out of 361 perforations occurred in girls between 17 and 26; in the same age-group, with three times the number of cases, we recorded only 6. The steady decline in female perforations is shown in fig. 2, which is a chronological arrangement of all the records we could find.[12-14 29-35 37-45] So far as we know, no-one has explained this great decline. In the months of heavy raids the ratio of male to female perforations in our series was 13 : 1.

The age-incidence of our collection is given in the table and in fig. 3. Jennings and Bager [14] noticed a tendency for perforation in males to take place at an earlier age (which they connected with an increase in duodenal and juxta-pyloric perforations). Our figures, which in fig. 4 are compared with the curves of Bager in Sweden, and with two groups of English and American cases between 1925 and 1940,[13-14 26-35 37-39] show a tendency for perforations to take place much later in life. We did find, however, that in our series perforations recorded

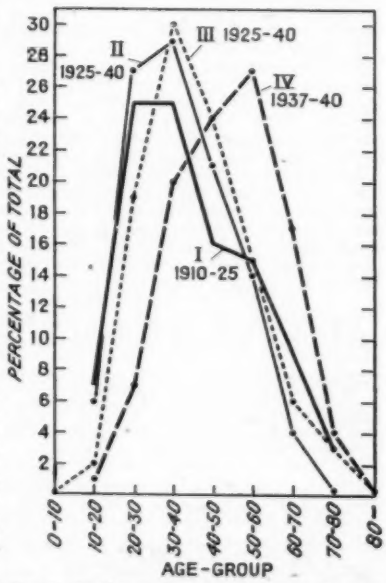

FIG. 4—Incidence of perforated ulcer in ten-year age-groups. I, Sweden 1910–25 (1089 cases). II, Europe 1925–40 (672 cases). III, United States 1925–40 (1678 cases). IV, present series 1937–40 (832 cases).

as duodenal had a younger age-incidence, with a very flat curve between 30 to 65, than the gastric perforations, whose curve was steeper, with a well-marked peak at the 50-60 level. In 1937 and 1938 the peak age-incidence occurred at 45–55; in 1939 it was 50–60; while in 1940 there was a peak at 50–60, coupled with a flattening of the curve which indicated more frequent perforations in men from 30 onwards. The greater age of our perforations was no doubt partly due to the absence of younger men from London owing to the call-up, but there was evidence of an older age-incidence even before the war began. Certainly the older age-incidence did not apply merely in the air-raid period, and the European and American collections, though more similar to Bager's Swedish figures, also show an increase in the 40–50 group. As the table shows, there was a remarkable constancy in the average age of perforation over our four-year period. In the group of gastric perforations there was a slight rise in average age in the blitz months. This was due to the inclusion of 6 very old cases. Similarly the slight fall in average age in the duodenal group marked the inclusion of a number of men of 19–33.

SUMMARY

Figures for 1937–40 from sixteen London hospitals showed a statistically significant increase in perforated peptic ulcers during the first two months of heavy air-raids (September and October, 1940).

The probable cause for this increase was anxiety.

Of the perforations in the four-year period, 93% were in men. The ratio of gastric to duodenal perforations was 1·6 : 1. The peak incidence was in the 50–60 group; this is contrasted with the peak between 20 and 40 in other series.

There was no significant change in age, sex or site among perforations in the air-raid period.

We are grateful to the authorities and records staff of the following hospitals: Connaught Hospital, Guy's Hospital, Lambeth Hospital,* Lewisham Hospital,* Metropolitan Hospital, Miller General Hospital, Poplar Hospital, St. George's Hospital, St. Giles' Hospital,* St. James' Hospital,* St. Mary Abbot's Hospital,* St. Stephen's Hospital,* University College Hospital, West London Hospital, Whipps Cross Hospital.

We also wish to thank Dr. Allen Daley, medical officer of health to the L.C.C., for permission to visit the hospitals under the council's control, marked with an asterisk, and to publish the figures; also the authorities and records department of Charing Cross Hospital, and in particular Mr. R. A. Fitzsimons, Dr. C. K. J. Hamilton, Mr. W. P. Greening, and Dr. R. D. Blachford.

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DIPHTHERITIC DIAPHRAGMATIC PARALYSIS TREATED IN BOX RESPIRATOR

J. M. TODESCO, M.D. FLORENCE, M.R.C.S., D.P.H.
RESIDENT MEDICAL SUPERINTENDENT OF THE BOROUGH HOSPITAL, CROYDON

THE following case is interesting on account of the successful treatment of the diaphragmatic paralysis by means of the box respirator and because of the many concurrent complications.

A girl of 3½ years was admitted to hospital on Sept. 23, 1941 as a severe case of diphtheria. There was extensive membrane covering both tonsils, the neck glands were much enlarged, she was cyanosed and her breath was fœtid, and the heart sounds were rapid and irregular. She had previously suffered from whooping-cough and measles. Her throat swab was positive for diphtheria before admission.

By Sept. 30 the throat was clean and the glands had subsided, but she vomited green fluid on several occasions and showed signs of incipient heart-failure; the pulse was rapid and of poor volume. All food by mouth was stopped but the vomiting persisted until Oct. 6, when the heart condition had improved though the pulse-rate was still increased. Right internal strabismus was noted. Two days later the heart went into gallop rhythm and albuminuria appeared. By Oct. 15 the heart had again improved but there was left palatal paresis; albuminuria, 3–6%, persisted. On Oct. 29, diplopia, right ptosis and left facial paralysis appeared; there was also much salivation. On Oct. 31, the 41st day of disease, her breathing became rapid and distressed, she was full up with secretion, her colour was poor and she developed diaphragmatic paralysis, the abdomen being fixed on respiration with exaggerated movement of the lower part of the chest. The heart sounds were rapid and weak. Owing to the dyspnœa, poor colour and excessive salivation she was put in the box respirator at 6.30 P.M. Soon afterwards she appeared more comfortable, both her colour and pulse improving. Except when removed for rectal feeding she was kept constantly in the respirator till Nov. 3, when abdominal breathing had definitely returned; but ptosis, diplopia, facial palsy and some salivation were still present. By Nov. 11 she seemed much better, the paralysis had cleared up and her heart sounds were stronger. Improvement continued; she was able to sit up in bed on Nov. 22, and started getting up on Dec. 4. She was discharged cured on Dec. 23, having been in hospital for 92 days.

Diaphragmatic paralysis, though not a common sequel to diphtheria, is a serious one and often fatal, and it is difficult to treat by the usual methods. Use of the box respirator as soon as this complication appears seems a good way of tiding the child over the paralytic period. In this case there was immediate relief, and the child did not resent being nursed in it. Such mechanical artificial respiration is reliable and easily applied. The apparatus used was the box respirator supplied to all hospitals by Lord Nuffield.

Of the 12 cases of postdiphtheritic paralysis treated by the Bragg-Paul pulsator recorded by C. J. McSweeney,[1] all of which had involvement of the diaphragm, 8 recovered completely; 2 of the 4 deaths were not directly connected with the diaphragmatic paralysis. In the case recorded here, as in those of McSweeney, the child appeared more comfortable when the pressure of the box respirator was reduced by opening the valves.

I wish to thank Dr. O. M. Holden, medical officer of health for Croydon, for permission to publish this case.

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44. Schwarz, E. (1925) *Disch. Z. Chir.* **192**, 239.
45. Jennings, D. (1940) *Lancet*, i, 395.

Reviews of Books

Age Morphology of Primary Tubercles

HENRY C. SWEANY, M.D., medical director of research, Chicago Tuberculosis Sanitarium. London: Baillière, Tindall and Cox. Pp. 265. 27*s.* 6*d.*

IN the acute exanthemata, lobar pneumonia and many other diseases, evolution of the lesion follows a time sequence. Dr. Sweany attempts to correlate in a similar way the age of the lesion with its morphology in the primary focus of tuberculosis. He suggests, among other analogies, that just as a geologist estimates the age of rocks by studying their strata, so the morbid anatomist should be able to reconstruct the sequence of events from the minute details of the pathological lesion. Even in the days of Galen lung stones were recognised as old lesions. Laennec related some of them to tuberculosis and distinguished between "bony" and "chalky" concretions; bony tissue forms in old lesions between the capsule and the calcified core. Dr. Sweany describes three stages through which a primary focus passes if it heals: an evolutionary phase; a period of maturation; and finally a stage of retrogression. The first, a pneumonia in miniature, begins with a monocyte reaction and ends with caseation; during the second, the limiting capsule is formed of collagenous fibres and calcium deposition begins; in the third stage fibro-osteoid tissue, bone and marrow are laid down. With these "geological strata" for his material Dr. Sweany has made a careful and elaborate microscopical study of primary foci, identified by post-mortem radiograms, and has expressed his results by a numerical assessment which may be likened to a system of marks. Though he claims that a numerical method of this kind helps to eliminate the personal factor, its workings are not always easy to follow. Using it, however, he has investigated 27 fatal cases infected before the age of seven, most of the patients having shown clear-cut infections in infancy. Arranged in age sequence, beginning with the shortest age interval between infection and death, and going on to the longest, the records range from that of a child of 7 to a man of 51. Having applied his numerical method to fifteen different qualities of the tubercle Dr. Sweany uses it for various other lesions including a calcified group of hæmatogenous "reinfects" in the spleen and liver. He estimates that these had been deposited during the hæmatogenous phase of the primary infections, most of them following the primary lesions within a few weeks or months and having approximately the same age appearance. There was, however, one notable difference in that typical bone was rarely found in spleen tubercles. The book is largely composed of case-records, and there are photographs of primary foci and post-mortem radiograms which must be almost unique. He has made a monumental study of more than 900 such radiograms.

Jameson and Parkinson's Synopsis of Hygiene

(7th ed.) Editor: G. S. PARKINSON, M.R.C.S., D.P.H., acting dean and director of public health department, London School of Hygiene and Tropical Medicine. London: J. and A. Churchill. Pp. 712. 25*s.*

THE first edition of this standard work appeared in 1920 and there is nothing else just like it. In this edition Professor Parkinson has not been able to draw on the collaboration of Sir Wilson Jameson (whose energies must be fully occupied in other directions) though it is still easy to detect his influence and inspiration. It is difficult to write a successful synopsis avowedly for students but to be read by many whose trials are no longer vested in examinations. Today, as the preface says, a new chapter is being written in the public health history of these islands; and a fascinating chapter it is, filled with experiments, many of which will influence postwar policy, though some must be ephemeral. Since it is as yet difficult to estimate how much will survive, the aim in this new edition has been to describe the outlook and technique of the immediate prewar period, except where these have been modified by advance in basic scientific knowledge. There is, however, a brief account of administrative measures arising from emergency, and references to fumigation of aircraft, protection against vermin, and disinfestation; there is a note, too, on recent regulations governing the lighting of factories. The statistical material has been brought up to date; immunisation against diphtheria and whooping-cough are discussed, and there are references to trichiniasis, leptospirosis, and the repercussions on public health administration of the effect of sulphonamides in cerebrospinal fever, gonorrhœa and puerperal infections. The approach which the book makes to the conception of social medicine as distinct from preventive medicine gives the student a new and salutary appreciation of problems which will confront him in his later work.

Medical Societies

ROYAL SOCIETY OF MEDICINE

AT a meeting of the section of Neurology held on Feb. 19 a discussion on

Cerebral Œdema

was opened by Dr. J. G. GREENFIELD, who emphasised the difficulty of determining the criteria from which the presence of œdema can be established. There are, he considers, no real differences between cerebral œdema and the brain swelling of German literature. The chemical method by which the water content of brain is analysed provides an accurate method of determining œdema, provided that the amount of associated congestion is allowed for by determining the iron content of the tissue. The histological changes include swelling of astrocytes, irregular swelling of myelin sheaths, beading and end-bulb formation of axons. Œdema is limited to white matter, but there is remarkable sparing of long commissural fibres such as those in the internal capsule. Important causes of cerebral œdema are cerebral ischæmia, cerebral abscess, cerebral tumour and cerebral contusion. With regard to fatal cases of head injury there is little evidence of generalised cerebral œdema, and recent studies have failed to provide evidence that it is ever a cause of death. Nor is there any obvious sound reason for the much used dehydration treatment. Dr. Greenfield also referred to less common causes of œdema, and to the passage of fluid from the ventricles into the cerebral white matter in cases of cerebral œdema.

Major W. RITCHIE RUSSELL considered cerebral œdema from the clinical point of view. The slight general swelling of the brain which may follow head injury probably, he said, causes an increase of intracranial pressure, but there is no satisfactory evidence to support the common belief that this is a cause of disorders of consciousness. The bradycardia during recovery from severe head injury may be associated with normal intracranial pressure and full consciousness. In conditions such as cerebral abscess or obstruction to a cerebral vein there is evidence to support the view that associated œdema causes paralysis of local cerebral function. Intravenous hypertonic solutions reduce intracranial pressure for a short time but they are likely to cause more shrinkage of relatively normal brain than of the œdematous area. There is a danger lest the diagnosis of cerebral œdema should be used to conceal our ignorance of the cause of certain cerebral states.

Dr. J. HAMILTON PATERSON reported the effects on the lumbar cerebrospinal fluid pressure of administering 50 to 100 c.cm. of 50% sucrose by the intravenous route. He made use of a method by which the spinal fluid pressure after lumbar puncture was recorded continuously for several hours. In eight subjects with normal pressure a reduction of pressure was demonstrated in only four subjects and the maximum reduction was 30 mm. of water which continued for only one hour. In eight subjects with raised pressure the intravenous sucrose caused no change in pressure in three cases. The maximum reduction observed was a fall of 50 mm. which lasted for less than 50 minutes, and thereafter the pressure rose above the original figure.

During the discussion which followed members emphasised the difficulty of interpreting the intracranial state from the spinal fluid pressure. Speakers also agreed that prolonged post-traumatic bradycardia is not due to increased intracranial pressure. The difficulties of recognising œdema were also emphasised and the need for further research was stressed.

VITAMIN THERAPY

IN THE DEBILITY OF CONVALESCENCE

As every physician knows, the period of debility following acute illness—as, for example, influenza and pneumonia—calls for special care because of the tendency to relapse or of the lowered resistance to other infections. Modern work on nutrition indicates that this state is due in no small measure to sub-normal nutrition from the restricted food intake during the illness and also partly to the increased utilization of food elements during the infection. Furthermore, there is much to support the view that many of the symptoms of such debility are actually manifestations of hypovitaminosis. Thus deficiency of the vitamin B complex may be shown clinically by anorexia, lassitude, mental and physical fatigue, atonic gastro-intestinal disturbances, constipation, irritability, nervousness, and cardiac weakness, all of which may be present in the debilitated state.

The probable part played by vitamins in rendering the body resistant to infections generally has been the subject of much investigation. Clinical studies have shown that mild deficiencies of vitamin A are comparatively common, and may lower the resistance to infection, since this vitamin helps to maintain a healthy, and therefore germ-resistant, condition of the epithelial tissues. Recently it has been claimed[1] that lack of vitamin C, nicotinic acid, or vitamin A may result in fuso-spirochaetal infection of the mouth, as in Vincent's angina. Vitamin C has been shown to be concerned in some way with raising the resistance to infections such as diphtheria, and, since infections cause a greatly increased demand for vitamin C, it is possible that this vitamin may be necessary in the production of immune bodies in the serum.

RESTORING THE DEFICIENT FACTORS

For curing many of the above-mentioned symptoms common to debility and to hypovitaminosis, the factors of the vitamin B complex are of established value. For improving the blood-picture, particularly in hypochromic and macrocytic types of anæmia, vitamin C is a valuable adjunct to more specific types of therapy. That vitamin C has a beneficial effect, too, on the muscular system is indicated by recent work[2]; which showed that the vitamin markedly increases the ability to withstand strenuous exercise, prevents painful muscular spasms from over-exertion, and renders the subject fresher and stronger after exercise.

To restore depleted reserves of vitamins and maintain an optimal level, the debilitated patient should receive, in addition to a diet liberal in energy-giving elements, a prolonged course of intensive vitamin therapy. Moreover, since clinical hypovitaminosis is almost always of a multiple character, *compound* vitamin therapy is advisable, generous amounts of all the available vitamins being given. This can be inexpensively, conveniently, and effectively ensured by the prescription of Complevite Tablets or Bemax, two products the vitamin potency of which is controlled by careful assay.

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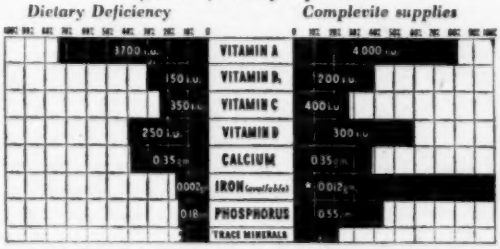

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[1] *J. Amer. Med. Assoc.* 1940, 114, 1073.

[2] *Schweiz. med. wschr.* 1941, 71, 715.

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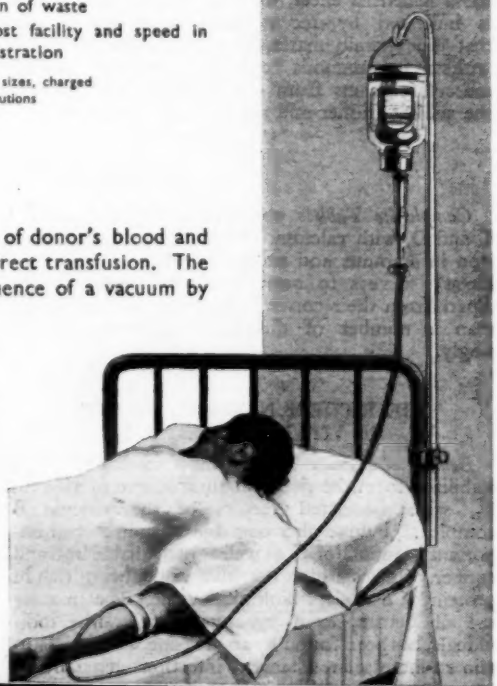

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THE LANCET

LONDON: SATURDAY, FEBRUARY 28, 1942

RUSSIAN INTERCHANGE

WE look forward when the war is over to enjoying happy relations with the Russians and to that vigorous exchange of scientific and artistic thought which is the best part of comradeship, whether between men or nations. In the meantime we are anxious to contribute in every way we can to the strength of their arms and their defences; and for the medical profession the course is plain: we would like to put at their disposal whatever information may be useful, and to find whatever equipment they need.

Something has already been done in both directions by the Anglo-Soviet Medical Committee; the appeal made by Sir ALFRED WEBB-JOHNSON, president of the committee, for surgical instruments has met with a good response which he acknowledges on another page; instruments worth about £3000 have reached him and less than 10% of these required repair. Those in perfect condition were greased and forwarded at once, while those needing overhaul or replating are being put quickly in order. A subcommittee dealing with medical supplies have been advising Mme. MAISKY, wife of the Soviet Ambassador, on the purchase of surgical instruments, X-ray sets, autoclaves and other equipment, and during the past three months 70 large cases of instruments, some weighing a quarter of a ton, have been dispatched. In addition, Sir PHILIP MANSON-BAHR and Mr. G. F. HOME are compiling a book for the committee, probably to be called "Reviews of British War Medicine," consisting of articles by recognised authorities. This is being translated into Russian by doctors who have volunteered for the task and will be printed as quickly as possible and sent to Russia through the Soviet Embassy. If this volume is a success it is hoped to make it the first of a series. References apd illustrations will be few, the aim being to produce a compact, informative and inexpensive book before the expected spring offensive begins. The object is not to try to teach the Russians anything (for they probably know far more about war medicine by this time than we do) but to say, in effect, "This is the way we do it. What do you think of it? And will you tell us about your own findings?" Thus the series may lead to an exchange of medical opinion which the profession in this country would greatly welcome. There are many things we should like to learn. For example, what standards do the Russians use in selection of troops? What is their age-limit for air pilots? Are they better provided than we are with rehabilitation and vocational training centres? Dr. S. GIRGOLOV, in *Soviet War News*, the bulletin issued by the Soviet Embassy, says that for frostbite they use rapid heating of the affected part and physiotherapy, including ultrashort waves, and remove damaged tissues early, but he gives no details. He also says they are using closed plaster more and more, and are employing plasma for transfusion on a large scale. Have they had much gas gangrene? Have they used local sulphonamides widely and has their experience been the same as ours? How do they send their blood to the front line? How are they treating burns? Are they using local anæsthesia for operations? Mr. ANTHONY EDEN has already undertaken to try to arrange an exchange of information about typhus.[1]

Many more questions spring to the mind on which shared experience would doubtless throw light; but apart from the written word what we should all like is a visit from a deputation of our Russian colleagues and the chance to exchange views and opinions and to establish a closer understanding which will help to found a lasting friendship.

PLANNED TREATMENT OF THYROTOXICOSIS

THE call to duty in acute disease is dramatic and rarely goes unanswered, but the challenge of chronic disease—far more important from the national standpoint—leaves us comparatively unstirred. LAYTON [2] has illustrated this dismal fact from his experience with middle-ear infections, but thyrotoxicosis provides as good an example. Here there is a great opportunity for close collaboration between general practitioner, physician and surgeon; but how often is this achieved? The Registrar-General's figures for deaths from thyrotoxicosis rose persistently during the twenty years, up to 1936[3] yet during the same period the fatality-rate among patients receiving skilled treatment in hospital fell to a negligible figure. Thus in a series of 1000 operations for toxic goitre done in 1934–39 KEYNES [4] had but 13 postoperative deaths. His analysis takes no account of the more remote postoperative complications but these would not raise the figure significantly. This is an example of what can be achieved in a special clinic by a skilled team. But the benefits then received by the few are only now beginning to be made available to the many, and, as LAHEY [5] says, where thyrotoxicosis is treated casually by individuals the mortality will remain distressingly high. It is largely the realisation of the importance of planned treatment which has brought down the mortality since 1936—from 1699 then to 1568 in 1938, to 1380 in 1939 and 1186 in 1940.

Much depends on the practitioner, who must diagnose thyrotoxicosis at an early stage; this may be difficult in masked forms, but in most cases the clinical picture is obvious. Once the diagnosis is made the patient should be referred to a hospital immediately. Too often the doctor temporises because he knows that the disease does not immediately threaten life. He knows too that iodine will afford relief; he prescribes it and persists with it for months. It is this delay, more than the iodine itself, which does harm. To give iodine without any other therapy while the patient continues at work, exposed to all her usual physical and psychic stresses, is thoroughly bad treatment. In the long run these circumstances will aggravate the disease in spite of iodine. Too often only when it has become very severe, or cardiac complications have developed, is the patient referred to hospital. It will then be a question of getting her well in spite of the doctor's treatment. About a third of the patients reaching hospital have had ineffectual, irregular or lengthy iodine therapy. Many others develop some complication, suddenly become worse

1. *Lancet*, 1942, i, 213.
2. Layton, T. B. *Lancet*, 1941, ii, 587.
3. McEwan, P. *Brit. med. J.* 1938, i, 1037.
4. Linnell, J. W. and Keynes, G. *Ibid*, 1939, i, 764.
5. Lahey, F. H. *New Engl. J. Med.* 1935, **213**, 475.

and die without ever reaching hospital. DUNHILL[5] taught that the clinical course of the disease falls into three stages: early thyrotoxicosis, established thyrotoxicosis, and thyrotoxicosis with complications. The earlier the stage at which the patient attends hospital the greater the likelihood of a satisfactory result; conversely, even in the most skilled hands, the mortality is appreciable in the final stage. The best incentive to the practitioner to send his patient to hospital in the first stage would be the assurance that treatment would be undertaken by physicians and surgeons specially interested in the disease and working in collaboration; in London and Edinburgh, for example, he can already be sure of this. Moreover the nursing staff of the ward to which the patient is admitted should understand the special psychological, cardiac and nutritional problems involved. We have much to learn from the Americans about such organised hospital treatment. Ideally every patient should be admitted for a short period of investigation, away from domestic and other stresses. The physician and surgeon, working together, should assess the stage and severity of the disease; and this can always be done more accurately if there has been no previous iodine therapy. Should thyroidectomy be deemed unnecessary, the patient can be referred to her doctor with appropriate advice; occasional attendances at hospital, however, will still be required so that the plan of treatment can be revised if progress is not satisfactory.

If iodine is given it should only be on the advice of the physician and surgeon supervising the case. Iodine is especially valuable in preparing patients for operation, because it produces an artificial remission during which thyroidectomy is relatively safe. In a crisis it ranks in value with the specific drugs—the confused and restless patient given iodine for the first time may in a few days become rational and comparatively quiet. It is over such cases that the physician sighs with relief to learn that no iodine has been given previously, for if crisis threatens in a patient who has already had much iodine the position is desperate. Intravenous iodine is often said to have special virtue in the treatment of thyroid crisis, but in view of the extreme rapidity with which iodine is absorbed from the alimentary tract[6] the intravenous route can have no advantage except in the rare cases with severe vomiting and diarrhœa. The form in which iodine is given matters little. COHN[7] demonstrated that Lugol's solution has no therapeutic advantage over potassium iodide. WASS[8] has recently suggested that di-iodotyrosine is superior to inorganic iodine in some cases, but this is not in accord with other evidence. Neither the form of the iodine nor the route of administration being of much moment, it remains to decide when to give it. As a sole method of treating established thyrotoxicosis iodine is of little value, but it has a place in the treatment of young women in whom the disease is of recent onset and seems unlikely to cause physical or psychical exhaustion. In some of these patients the disease may subside after a comparatively short course, but they must be watched closely and thyroidectomy should not be delayed too long if they do not improve. The body-weight is a good guide to the patient's progress, and estimation of the severity of the disease by its clinical effect on the patient rather than by the metabolic rate has much to recommend it. Such expectant treatment, with or without iodine, is best reserved for early and mild thyrotoxicosis in young women—it has no place in cases occurring in later life. Even a trifling degree of thyrotoxicosis in the middle-aged patient with a nodular goitre calls for thyroidectomy, because of the risk of cardiac complications. SMITH[9] reminds us that associated heart disease makes the occasion still more urgent. Auricular fibrillation and failure are naturally more likely to arise in hearts subjected to the double strain of thyrotoxicosis and organic disease.

5. Dunhill, T. P. *St. Bart's Hosp. Rep.* 1934, **67**, 184.
6. Elmer, A. W. Iodine Metabolism and Thyroid Function, London, 1938.
7. Cohn, B. N. E. *Arch. intern. Med.* 1932, **49**, 950.
8. Wass, S. H. *Lancet*, 1941, ii, 34.

STUDENTS IN UNIFORM?

YOUNG men are rightly touchy when they fancy themselves suspected of evading military service; and most are their own sternest critics in this direction. In the last war medical students were spared the ordeal of examining their motives because they were called up as soon as they were of an age to serve—a policy which led to a serious falling off in the numbers qualifying. In this war, since April, 1941, all medical and dental students have been reserved from the date of their acceptance by a recognised medical school, each school having to keep its admissions within an allotted quota. This throws the responsibility for choosing between military service and a reserved occupation on the senior schoolboy or his parents. Many of the more enterprising boys and more public-spirited parents no doubt take the short-term view that immediate action in a fighting service is more valuable to the country than a promise of action as a doctor several years hence. Fortunately for the post-war profession this view has not so far led to a fall either in numbers or quality of the applicants for at any rate the larger medical schools, but a peripatetic correspondent suggests that the exempted student's work suffers from the constant nagging of his conscience and of white-feather friends. The difficulty would, he thinks, be overcome if all medical students were called up on reaching military age and then sent back in uniform to complete their medical training. The uniform itself is but a minor part of the proposal, though it should offer better protection from white feathers than the badge for the buttonhole which some medical schools now supply. For the newly qualified man there is already no problem: the Central Medical War Committee sends him where it thinks him most useful—and our correspondent is urging that it would set the student's mind at rest, and ensure our profession a fair share of good men, if students were equally bereft of choice, once they were well along the road to qualification. By the time they reach 18½, the calling-up age, most medical students have passed their premedical examinations and entered on the preclinical years. They are then no longer entitled to be extravagant with their persons, and the country has a fair claim on their future service as doctors. Certainly the young man who has gone from school to medicine and sees every prospect of qualifying need feel no prickings of conscience if he decides to keep on with his studies, for there are no cushy jobs these days.

9. Smith, S. A. *Med. J. Aust.* 1941, ii, 311.

Annotations

CHEMICAL TESTS FOR VITAMIN DEFICIENCIES

AFTER chemical identification of each vitamin the next step has always been to devise a test to estimate it in body fluids, with the object of ascertaining the body's reserves (or the nutritional status, level of nutrition, or degree of saturation as it has been varyingly styled). Vitamin C was the pioneer. Patients with scurvy were shown to be so unsaturated that they need about a week of test-dosing with the vitamin before they allow excess to overflow in their urine; whereas subjects who have received ample vitamin C, and whose reserves are therefore full, respond by excretion on the first day of the same dosing; intermediate responses denote intermediate levels.[1] The application of this test led to several significant findings—for example, scorbutic or near-scorbutic levels are common in patients kept on "gastric" diets without supplements of vitamin C,[2] and in infectious diseases, especially phthisis, the needs are increased so that the tissue reserves and urinary responses are diminished.[3] Lately urinary excretion tests, or similar methods using blood, have been employed for social surveys. For vitamin B_1 a similar procedure is available.[4] Patients with beriberi excrete little or no vitamin B_1, and those with good intakes of the vitamin excrete more than those with mediocre intake. Test-dosing again gives the most reliable information and has been useful in confirming that a conditioned deficiency (by which is meant a faulty absorption or utilisation of the vitamin) is the cause of polyneuritis associated with pregnancy, alcoholism or gastro-intestinal obstruction. A test of the same type has been worked out for the anti-pellagra factor, nicotinic amide.[5 5a] Cambridge workers have recently emphasised that nicotinic amide in the diet is partly excreted as trigonelline[6]; this substance is present in foodstuffs, but when taken by mouth is biologically inactive. Hence two procedures can be used in the test: either the intake of trigonelline must be restricted by giving a specially controlled diet, in which case the excretion of trigonelline plus nicotine amide can be estimated, or, if the diet is unrestricted, the nicotinic amide alone must be estimated.

A different type of procedure depends on detecting a change in chemical function associated with the deficiency. It is known that in deficiency of B_1 there are abnormalities in the intermediate metabolism of carbohydrates, and as long ago as 1922 it was shown that lactic acid is present in excessive amounts in the tissues of animals deprived of vitamin B_1.[6] Dogs or men with beriberi have persistently high lactic acid in their blood after exercise, whereas normal controls are able to dispose more rapidly of the lactic acid which accumulates[7]; in vitro, vitamin B_1 added with lactic acid to tissue preparations from deficient animals aids in restoring the oxidative process.[7a] Attention later shifted to pyruvic acid, the importance of which for intermediate metabolism of carbohydrates had been indicated by the work of Meyerhof and others. From the now classical experiments of K. Lohmann and P. Schuster[8] we know that vitamin B_1 functions in the organism in the form of its pyrophosphate ester as a co-enzyme (co-carboxylase) needed in the breakdown of pyruvic acid. Experiments on animals and clinical tests show that there is excessive pyruvic acid in the blood of animals or humans with beriberi, and that the abnormality disappears on cure.[9] Examination of the blood for pyruvic acid is thus a method of confirming the presence of active avitaminosis B_1; a limitation is that the pyruvic acid may not be raised in the early, or subclinical, stages of the deficiency. To detect minor degrees of deficiency, and thus to assess the level of nutrition, loading tests were accordingly suggested by Harris and his colleagues. In rats it was found that loading with lactic acid and estimation of the abnormal excretion of bisulphite-binding substances (mostly pyruvic acid) in the urine served to reveal the extent of a latent deficiency; for men, however, lactic acid was not a suitable substance for the test dose and in its place glucose or other carbohydrate metabolites were proposed[10]; these findings were confirmed by McCollum and others in America.[10a] A similar procedure is that usedby Elsom and his colleagues, who dose the patient with glucose and examine the blood-pyruvate curve.[11] In normal subjects there is only a transient rise in the pyruvate figure whereas in deficiency the fall is slower. Ellis Wilson's investigation[12] of the blood of normal children of the hospital class is reassuring as showing that the blood pyruvate was not raised above the figure found in a similar class of children studied in America; which means that any advanced deficiency of vitamin B_1 was at any rate absent. It does not necessarily mean that all the children were having sufficient vitamin B_1 for health, for tests in America and elsewhere have often proved that apparently normal children show improved gains in weight and height when additional vitamin B_1 is added to an average diet.[13] Loading tests might be expected to indicate the presence of these minor departures from normality, or of latent deficiency.

RESUSCITATION IN SHOCK

No effective measure of degree of shock has yet been devised. Dr. R. T. Grant, speaking at a joint meeting of the sections of medicine and surgery of the Royal Society of Medicine on Jan. 27, pointed out that this lack of a criterion makes it difficult to assess the value of various methods of treatment. It is often uncertain, he said, whether the patient has lost much blood or little, and difficult to tell what part nervous influences are playing in the collapse. Yet in assessing the need for a transfusion he places more weight on the severity of the injury and the blood loss than on the state of the blood-pressure, which may be normal, and associated with a normal pulse-rate and even with a good colour, in spite of much loss of blood. In patients whose blood-pressure has fallen, return to a normal systolic pressure, and its maintenance, can be taken as the chief indication that an adequate volume of blood has been transfused. The rise of pressure accompanying a rapid transfusion is not always maintained, he has found; whereas a slower injection makes for a more gradual but better sustained rise. He prefers to transfuse blood rather than plasma, especially when giving a large transfusion; and in this Mr. Vaughan Hudson agreed with him, though he finds it convenient in war-time to reserve

1. Harris, L. J. and Ray, S. N. *Lancet*, 1935, i, 71; Harris, *Ibid*, 1940, ii, 259.
2. Harris, Abbasy, M. A., Yudkin, J. and Kelly, S. *Ibid*, 1936, 1488; Archer, H. E. and Graham, G. *Ibid*, 1936, ii, 364.
3. Harris, Passmore, R. and Pagel, W. *Ibid*, 1937, ii, 183; Abbasy Harris and Ellman, P. *Ibid*, p. 181.
4. Harris and Leong, P. C. *Ibid*, 1936, i, 886; Harris, Leong and Ungley, C. C. *Ibid*, 1938, i, 539; Harris and Wang, Y. L. *Biochem. J.* 1939, **33**, 1356; *Ibid*, 1941, **35**, 1068; Wang and Yudkin *Ibid*, 1940, **34**, 343.
5. Harris and Raymond, W. D. *Ibid*, 1939, **33**, 2037; 5a. Kodicek, E. and Wang, *Nature, Lond.* 1941, **148**, 23.
6. Collazo, J. A. *Biochem. Z.* 1922, **134**, 194; *Ibid*, 1923, **136**, 278; Bickel, A. *Ibid*, 1924, **146**, 493; *Ibid*, 1925, **166**, 251; Juno, Y. *J. Orient. Med.* 1926, **5**, 29; Pugliese, A. *Arch. Sci. biol., Napoli*, 1928, **12**, 251; *Arch. ital. Biol.* 1929, **81**, 91.
7. Inawashiro, R. and Hayasaka, E. *Tohoku J. exp. Med.* 1928, **12**, 1; Hayasaka, *Ibid*, 1930, **14**, 487; 7a. Gavrilescu, N. and Peters, R. A. *Biochem. J.* 1931, **25**, 1397, 2150; *J. Physiol.* 1931, **72**, 32 P; Meiklejohn, A. P., Passmore, R. and Peters, *Biochem. J.* 1932, **26**, 1872.
8. *Naturwissenschaften*, 1937, **25**, 26; *Biochem. Z.* 1937, **294**, 188.
9. Thomson, R. H. and Johnson, R. E. *Chem. Ind.* 1934, **53**, 1024; Platt, B. S. and Lu, G. D. *Proc. physiol. Soc. Conf. Chin. med. Ass.* 1935.
10. Banerji, G. G. and Harris, *Biochem. J.* 1939, **33**, 1346; Harris, *Ann. Rep. chem. Soc.* 1940, **37**, 387; 10a. Shills, M. E., Day, H. G. and McCollum, E. V. *J. biol. Chem.* 1941, **139**, 145; Harper, H. A. and Deuel, H. J. *Ibid*, 1941, **137**, 233.
11. Elsom, E. O'S., Lukens, F. D. H. and Montgomery, E. H. *J. clin. Invest.* 1940, **19**, 153.
12. *Lancet*, 1942, i, 199.
13. Summerfeldt, P. *Amer. J. Dis. Child.* 1932, **43**, 284; Joslin, C. L. and Helms, S. T. *Arch. Pediat.* 1937, **54**, 533.

blood for exsanguinated patients and to use the more practicable plasma for the rest. The effective treatment of the wound—by removal of dead and dying tissue, relief of tension, and immobilisation—helps to avert further shock. For patients needing immediate surgery he orders a plasma drip in the resuscitation ward; in the anæsthetic room a small dose of 'Pentothal' is injected into the drip tubing, and the skin is prepared with the patient under gas and oxygen. In the recovery ward the patient's fluid intake and output are carefully supervised. This routine is also followed with burned patients, the plasma drip being established by cutting down through burned tissue if necessary. Dr. M. D. Nosworthy considered that it is always better to start a transfusion with plasma even if blood is ultimately to be used, because plasma runs much more readily into the veins of the shocked patient; and Dr. John McMichael thought it a mistake to dismantle the apparatus after the original transfusion has been given; it should be used to maintain a drip while the operation is being done. The value of morphine in shock was also discussed. Dr. Grant said that though he has not seen bad results follow gr. ¼, the alkaloid is not well tolerated by some patients, and other drugs, such as choral or bromide by mouth or rectum, might be used more freely. Dr. Nosworthy thought that morphine has no specific anti-shock value, and that it should not be given when the patient is in no pain because it is likely to increase any anoxia already present. Some frail patients admitted moribund to hospital, having had as much as gr. 1 of morphine, have really died of an overdose. At some first-aid posts, it seems, the standard dose is gr. ¼, which may be too much for many patients. Dr. Nosworthy believes that adequate sedation without respiratory depression can be achieved by giving a much smaller dose of morphine together with scopolamine—a drug which in contrast to morphia helps to allay fear. Restlessness unassociated with pain is better controlled, he thinks, by intravenous paraldehyde than by morphine. Mr. E. G. Slesinger, however, was not willing to hear morphine disparaged. Whatever may be the case with civilian casualties, most of whom reached hospital early, Service casualties are, he said, almost invariably in pain by the time they reach a casualty clearing station, and they need morphine; great pain can be dramatically relieved by giving morphine intravenously.

CHEMOTHERAPY IN SCARLET FEVER

THE precise rôle of chemotherapy in scarlet fever is uncertain. F. H. Top and D. C. Young in America, having previously demonstrated the value of convalescent serum and antitoxin, investigated the effect of sulphanilamide alone in the treatment of scarlet fever.[1] Their results are unexpected: the duration of initial pyrexia was naturally shorter in the convalescent serum and antitoxin groups, but no other obvious therapeutic advantage could be claimed over sulphanilamide alone. In this country scarlatinal antitoxin is accepted as the basis of treatment of scarlet fever; fairly general support has also been given to chemotherapy in the management of certain complications such as otitis as they arise. Whether chemotherapy can prevent such complications is much more doubtful. B. A. Peters and R. V. Havard,[2] E. C. Benn[3] and others were impressed with the results of combined treatment, but advantages were not demonstrated by the experiments of J. C. Hogarth[4] and J. O. French.[5] Assessment of any therapeutic agent in scarlet fever is difficult at present because of the mild character of the disease. Moreover, in hospital practice there is always the possibility that incidents regarded as complications may in fact be streptococcal reinfections which the initial treatment could not be expected to influence. On the whole, though it was rational to suppose that chemotherapy might prove complementary to antitoxin in treatment, no clear case has been made for the routine administration of sulphanilamide or any of the later preparations in the prevalent mild type of scarlet fever.

1. *J. Amer. med. Ass.* 1941, **117**, 2056.
2. *Lancet*, 1937, i, 1273.
3. *Brit. med. J.* 1939, ii, 644.
4. *Ibid*, 1937, ii, 1160.
5. *J. Hyg., Camb.* 1939, **39**, 581.

AMONG THE LEAVES SO GREEN-O

"Nebuchadnezzar the King of the Jews
Suffered from new and original views.
He crawled on his hands and knees, it's said,
With grass in his mouth and a crown on his head."

Horses and cows do so well on grass that man has often cast an envious eye at them. The Food Group of the Society of Chemical Industry has gone further and thought of a plan by which we can share with these noble beasts all the pleasures of a graminivorous diet. At a meeting on Feb. 11, to discuss green leaves as a source of protein and other nutrients, Mr. N. W. Pirie, whose views have already been published,[1] contended that we should make more economical use of leaf protein if we took it directly instead of in the form of beef and mutton. But whereas ruminants can take the grass leaf as a whole and use a large part of the fibre as a source of energy, man is not so constituted. Leaf proteins, however, can be separated by extraction and precipitation, and Mr. Pirie believes the method could be applied on a large scale. Grass would provide the readiest material, since it occupies more acreage than any crop in the country; and its protein content can be increased with nitrogenous manures. About 30% of the whole leaf protein can be economically extracted, and the remaining residue, containing 70%, could be used for animal fodder. A part of our imported meat or milk products could thus be replaced by leaf protein, and part of imported fodder by leaf residue. He believed the cost of such protein would be less than that of fish, cheese, milk or meat, and estimated that 140,000 acres of grassland under intensive cultivation would provide sufficient protein to replace 1–2% of the annual national requirement. Other speakers disclosed those secret and nutritive qualities of grass which cows have never questioned. Prof. A. C. Chibnall, F.R.S., for example, pointed out that the protein of cocksfoot grass is quite as good as that of whole milk, and better than that of white flour, which in addition to its other drawbacks is deficient in isoleucine. Mr. V. H. Booth, Ph.D., laid bare the vitamin content of grass which is packed with carotene, vitamin B_1, riboflavine, nicotinic acid amide, vitamin E, vitamin K, and the grass juice factor; ascorbic acid is there too, but will not stand up to processing because of the presence of an active oxidase system. Vitamin B_1 and riboflavine, however, could only be taken in sufficient quantity by eating far too much grass extract for comfort; so that the chief merit of grass as a source of vitamins is their carotene content. This, it seems, is liable to diminish on storage, and Mr. A. F. Pollard, Ph.D., pointed out that the dried carrot pomace now being produced from surplus carrots by the Long Ashton Research Station, contained enough carotene to make it unnecessary for us to wring carotene from grass. Professor Chibnall, while complimenting Mr. Pirie on his scheme from the scientific point of view, doubted whether it could be got to work under present conditions. There would be trouble about intensive cultivation of large tracts of grassland suitably situated for large scale processing; and the amount of first-class protein obtainable would fill a very small corner of the national belly. He thought it would be more useful to cultivate grasslands with intent to increase our supply of milk which is not only a source of first-class protein but a first-class food. In fact, he said, what people wanted was not a new food but more bacon and eggs—which suggests that Professor Chibnall had finally jibbed

1. *Chemistry and Industry*, 1942, **61**, 45.

at all thought of grass, even in the modified form of a Sunday joint. Nobody seems to have mentioned how Mr. Pirie's grass food would taste. It might be very nice, but

> "A pioneer men always abuse
> Like Nebuchadnezzar the King of the Jews."

ECONOMY IN THE MUSEUM

EVEN museum specimens cannot now be preserved without an eye on both expense and the ration-book. The three common methods for preserving the natural colours of organs are Jores's, Pick's and Kaiserling's, and relatively large quantities of methylated spirits and glycerin are used in all of them. Potassium salts are also part of the recipe and potassium is scarce. Pathologists have been forced to improvise, and unfortunately the results of their improvisation may only become obvious years later, when the specimen may be lost for good. The advantage of the method devised by Wentworth [1] is not only that his solutions can still be readily made but that they have been tested for some years. Wentworth suggests that the specimen to be mounted should first be fixed for three months either in formol-saline or in a mixture of 40 g. of sodium acetate, 100 c.cm. of formaldehyde (40% solution) and water to a litre. It is then immersed for at least a fortnight in a 10% solution of sodium acetate to remove excess formalin, and after trimming is mounted in a 10% watery solution of sodium acetate from which the air is removed either by boiling for a minute or two or by a pump. Finally sodium hydrosulphite (*not* "hypo") is added in amount equivalent to 2·5 g. per kg. of tissue and the lid of the jar promptly sealed. As soon as it is safe the jar is rocked to diffuse the hydrosulphite. Wentworth says that the natural colours of the tissue are usually restored in a few days, the restoration depending on the reducing properties of the hydrosulphite.[2] He has treated several hundred specimens by this method with consistently good results.

TESTS FOR SIMMONDS'S DISEASE

DESTRUCTION of the anterior lobe of the pituitary is responsible for Simmonds's syndrome. Lack of trophic hormones from the pituitary causes atrophy and loss of function of the gonads, the thyroid and the suprarenal cortex, and there are disturbances in the hormonic control of carbohydrate metabolism, of growth, and probably of various other processes. Objective evidence of the loss of gonad activity is easy to obtain in women if not in men; similarly the fall in basal metabolic rate gives evidence of hypothyroidism. Arrest of growth and of fusion of epiphyses is obvious if the lesion occurs in childhood. But till recently we have had no reliable test of the other two basic functional disturbances: those of the suprarenal cortex and of carbohydrate metabolism. This gap has now been filled by two tests devised by Fraser and Smith.[3]

Their test of suprarenal cortical function is based on the urinary excretion of 17-ketosteroids. These substances are produced by the suprarenal cortex and can easily be estimated in the urine. The amount normally deriving from the suprarenals and excreted is about 9 mg. per day, though it is greatly increased in some hyperplasias, and in tumours, of the suprarenal cortex.[4,5] The testes produce about 5 mg. per day of similar substances which appear in the urine and give the same reaction. For practical purposes these are the only two sources of 17-ketosteroids in the body. Thus a man excretes 14 mg. per day normally, but only 9 mg. if he is castrated, only 5 mg. if he has Addison's disease, and none at all if he has lost the function both of his suprarenal cortex and of his testes. The usual cause of this combined dysfunction is, of course, hypopituitarism. A woman excretes 9 mg. per day normally, and this amount remains the same if she has her ovaries removed but falls to zero if, as a result of either Addison's disease or hypopituitarism, she loses her suprarenal cortical function. Thus all patients with Simmonds's disease have absence of 17-ketosteroids from their urine; and a similar absence occurs in women with Addison's disease. In addition some patients with myxœdema have reduced 17-kestosteroids in the urine. The test alone is thus insufficient to distinguish Simmonds's disease from the two diseases it most closely simulates—myxœdema in either sex and Addison's disease in women.

A second test used by Fraser and Smith is an insulin-tolerance test, previously studied in a wide variety of diseases.[6] The patient is given intravenously a standard dose of 0·1 unit insulin per kg. of body-weight, after which the blood-sugar falls rapidly and then rises more slowly. The fall is due to the insulin, but may be delayed by the insulin-antagonistic action of the glycotropic hormone of the pituitary. In a normal patient the blood-sugar sinks to about 45 mg. per 100 c.cm. in 20–30 min.; in Addison's disease the fall is usually at the same rate. In Simmonds's disease the patient has an excessive insulin sensitivity due to the lack of glycotropic hormone, and the same fall can be obtained with a third the dose of insulin. In myxœdema there is insulin resistance, and the maximum fall is not reached until after 45–60 min.—a delay which may possibly be related to the hypertrophy of the anterior lobe of the pituitary found in this condition. The subsequent rise in the blood-sugar level in response to the hypoglycæmia is essentially due to suprarenal cortical hormone. In normal patients the blood-sugar rises about 70 mg. per 100 c.cm. in 90 min. from the time of the maximum fall. The same happens in patients with myxœdema, though the actual time after the injection is later because the maximum fall is delayed. But where there is gross insufficiency of the suprarenal cortex (as in either Addison's disease or Simmonds's disease) the response to hypoglycæmia is diminished and the blood-sugar rises only about 20 mg. per 100 c.cm. in 90 min. from the time of the maximum fall. The test thus differentiates Simmonds's disease quite clearly from myxœdema; but in order to distinguish it satisfactorily from Addison's disease the dose of insulin must be reduced to a third—a modified test calling for further study.

This summary is necessarily somewhat oversimplified. A very low 17-ketosteroid excretion and an insulin tolerance curve of the type which occurs in Simmonds's disease may also be seen in severe liver disease or in malnutrition due to intestinal disease; these, however, are easily recognisable clinically. Addison's disease in a woman may cause confusion, but clinical examination should again settle the point because in Simmonds's disease there is no pigmentation, the entire genital tract is superinvoluted, body hair is lost, symptoms of hypothyroidism appear, and there are other evidences of a lesion destroying the anterior pituitary. The differential diagnosis of anorexia nervosa from Simmonds's disease seems to present difficulties in other countries,[7] but these two tests gave a clear answer in all the cases studied by Fraser and Smith. Indeed, unless their two tests give the characteristic responses a diagnosis of Simmonds's disease cannot be accepted.

1. Wentworth, J. E. *J. Path. Bact.* January, 1942, p. 137.
2. The chemical formula of this substance is $Na_2S_2O_4$. It is a powerful reducing agent used by dyers, bleachers and sugar refiners. Its proper name is sodium hyposulphite; but as this name has been quite improperly appropriated by photographers and others for $Na_2S_2O_3$, sodium thiosulphate, it is convenient to use the trade name of "hydrosulphite" although it has no chemical justification whatever.
3. Fraser, R. and Smith, P. H. *Quart. J. Med.* 1941, **10**, 297.
4. Fraser, Forbes, A. P., Albright, F., Sulkowitch, H., and Reifenstein, E. C. *J. clin. Endocrin.* 1941, **1**, 234.
5. Patterson, J., McPhee, I. M. and Greenwood, A. W. *Brit. med. J.* 1942, **i**, 35.
6. Fraser, Albright and Smith, *J. clin. Endocrin.* 1941, **1**, 297.
7. Roch, M. and Monnier, M. *Schweiz. med. Wschr.* 1941, **71**, 1009.

LORD MIDLETON AND THE ARMY MEDICAL SERVICE

STJOHN BRODRICK was Secretary of State for War during the years 1900–03 and there was no exaggeration in the tribute to his memory in the House of Lords last week about the part he played in reforming the medical service of the Army after the South African War. "I do not say that he started that reform," said Lord Fitzalan, "but it would not have been carried out unless he had taken it up." And twenty years later Lord Midleton (as he had then become) had his reward when he presided at a banquet in London to the RAM department and listened to the words of the director-general of the service. "Nothing much was done that was practical," said Keogh, "until God sent the cause of medical reform two men—Midleton and Haldane. Lord Midleton gave the officers of the RAMC the opportunity for postgraduate study which made their scientific position sure, and he founded the school in London." Keogh might have added that whether in peace or in war medicine is one and indivisible, and the official recognition of that fundamental fact dates from the period of Mr. Secretary Brodrick.

ROCKEFELLER STUDENTSHIPS: WANDERJAHRE

THIS year the Rockefeller Foundation is again generously offering studentships to enable twenty-five of our medical undergraduates to take part of their clinical courses at medical schools in the United States and Canada. The offer, which is open to men and women, is made primarily to help students in schools which have suffered from enemy action, but application from all medical schools in England, Wales, Scotland and Northern Ireland will be welcome. The studentships will usually be tenable for two years, though shorter periods may be arranged, and they will cover all tuition fees and maintenance but not the cost of travel to and from America. The students must return to this country to take their final examination. The medical schools of the following universities are prepared to take one or two students:

California, Chicago, Cincinnati, Columbia, Cornell, Duke, Harvard, Illinois, Iowa, Johns Hopkins, McGill, Michigan, Minnesota, New York, Pennsylvania, Rochester, Stanford, Toronto, Tulane, Vanderbilt, Washington, Western Reserve, Wisconsin and Yale.

Applications may be submitted only through the dean of a medical school who must also send a full and confidential report of the candidate. Medical certificates including a radiogram of the student's chest must also be submitted, and special mention is made of the importance laid on the examination of the eyes and ears. Applications should reach the secretary of the Universities Bureau of the British Empire, Gower Street, London, W.C.1, not later than April 25. The students will probably leave this country early in August.

A GERMAN PSYCHIATRIST

PAUL SCHROEDER, who held the chair of psychiatry at Greifswald and later at Leipzig, died in Germany last year at the age of 67. He was a pupil of Kraepelin and though he later dissociated himself from this school his interest in the problems of clinical psychiatry as outlined by Kraepelin endured. Schroeder's early work was on cerebral histopathology and his "Introduction to the Histology and Histopathology of the Nervous System" was translated into English in 1923. In his writings on hallucinations he tried to get away from the French sensory bias and to look instead at the symptom-complexes in which the so-called hallucinations occurred. At Leipzig, where he succeeded Bumke, he took over a well-equipped modern neuropsychiatric hospital which was attached to the university, and to this he added a children's department which was one of the first of its kind in Germany. He also founded the Deutsche Gesellschaft für Kinderpsychiatrie und Heilpädagogie. Forensic psychiatry, juvenile delinquency, and psychopathic personalities were other topics which interested him, and his latest works on child psychiatry dealt with the study of character. Though Schroeder did not open new paths his views were sound, his work reliable, and after the Nazis took over he courageously tried to keep up his standards.

NEW OFFICIAL NAMES FOR DRUGS

THE General Medical Council has approved two further names for substances now being produced, or likely shortly to be produced, by British manufacturers (in some instances under licence) which have hitherto been known under other names. The question of including these substances in the British Pharmacopœia is under consideration and if any is included the approved name given below will be its official title.

Approved Name	*Other Name*
Meprochol	Esmodil
Cyclobarbitone	Phanodorm

It is hoped that these approved names will be generally adopted.

CANTEENS AT WORK

Mr. GARDINER'S book gives a glimpse into a Shavian world of rational planning where machines will be, as they should, the slaves of man lessening his burdens and increasing his efficiency and zest for life.[1] He holds that the importance of canteens is as great in peace as in war, seeing that they enormously increase output by providing rest and refreshment, ensure economy of food and money, and give a properly balanced diet which workers are likely to miss in their own homes in these days of universal tin-openers. The Government, recognising as much and also that "canteens are second only to wages as a draw," has made them part of its policy; and this book will be of great value to everyone who has to organise and run a canteen. Mr. Gardiner believes in making full use of modern labour-saving machinery, such as the bread-and-butter cutter which does the work of four full-time girls and the tea-urn which keeps tea perfect in taste and temperature for as long as six hours; but he also has the psychological aspect of the job in mind. Thus he insists that the dining-room must be a restful-looking and cheerful place, with plenty of space and light and with bright yet restful colours in the decorative scheme. The tonic effect on the kitchen staff of shining, stainless steel is noted, and even in the planning of the menus he reminds us that "those who have studied food know that contrast in colour creates appetite—all-white vegetables with all-white fish is not nearly so tempting as carrots against a creamy sauce." He deals fully with lay-out and design, equipment, stores, finance, food and staff management. The book has a cover which charms the eye and is well illustrated with photographs and diagrams; and the appendix includes lists of necessary equipment for canteens of all sizes, and specimen menus with prices. Mr. Gardiner's ideas of equipment, however, in these days when materials and labour are scarce incline to the lavish, and some of the menus quoted give the impression that rationing has not been introduced yet. But underlying principles are always clearly stated and would serve as a guide for war-time planning.

1. Canteens at work. By C. G. Gardiner, managing director, National Catering Service, London. London: Humphrey Milford, Oxford University Press. Pp. 104. 4s. 6d.

The Index and title-page to Vol. II, 1941, which was completed with the issue of Dec. 27, will be ready shortly. A copy will be sent gratis to subscribers on receipt of a post card addressed to the Manager of THE LANCET, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

Special Articles

MEDICINE AND THE LAW

Relief from War Indebtedness

LAST June Parliament passed the Liabilities (War-Time Adjustment) Act, for the benefit of folk who find themselves "in serious financial difficulties owing to war circumstances." A recent case in the Plymouth county court showed how a doctor, embarrassed by war-time difficulties, can be helped and protected from bankruptcy. The debtor had practised in London before the war. When hostilities broke out, he was called up from the Supplementary Reserve (Medical Branch) for service with the Royal Navy. A year later his surgical and medical equipment and his furniture and household effects, warehoused in London, were completely destroyed by enemy action. He had insurance policies to keep up, interest on borrowed money to meet, income tax and war damage contributions to pay, and such other outgoings to settle as a professional man cannot avoid. His position could fairly be described as one of "serious financial difficulties owing to war circumstances," the last two words being defined by the act as circumstances directly or indirectly attributable to any war in which His Majesty is engaged. He applied, as section 1 of the act enables him to do, to a "liabilities adjustment officer." There is one at least of these officials in every county court district; the debtor obtains their services free unless there is any special expense to be incurred in the proceedings; even this can be remitted in cases of hardship. The debtor is entitled by the act to obtain in this manner "advice and assistance in enabling him to arrive at an equitable and reasonable scheme of arrangement with his creditors, and, in particular, at such a scheme of arrangement as will enable him, if he carries on a business (or would, but for war circumstances, carry on a business) to preserve that business or to recover it when circumstances permit." The official went into the doctor's liabilities and presumably communicated with the creditors (only one creditor thought it necessary to attend the court) and drew up proposals which would give the debtor the prospect of tiding over his financial troubles. The judge accepted the scheme and confirmed it by an order of the court. To state the arrangements briefly, a sum of £70 standing to the doctor's credit was to be paid into court; the liabilities adjustment officer would have first claim on what the War Damage Commission would pay; the doctor would keep up his payments on three life insurance policies and the interest charges on loans secured by those policies; so far as he could, he would vest the policies in the adjustment officer; he would also transfer to him any special grants received and he would for the present pay into court £2 per month; finally, he would collect as much as possible from his book debts and pay that money also into court. The doctor informed the judge of his hope of increasing the monthly payment from £2 to £5 as soon as certain deductions from his salary for income tax arrears ceased.

Men in the debtor's position are passing through a hard time; but the act seems to offer them valuable help. It is, moreover, being administered with conspicuous sympathy. The liabilities adjustment officer, for instance, pressed the judge at Plymouth to hear the application "in chambers" and not in open court. He emphasised the misfortune to a professional man if his name and address should be broadcast in the press. Although some courts, it seems, are conceding this point, the court at Plymouth had the usual judicial dislike of secrecy. The judge observed that the act, by requiring the earlier proceedings to be in private, inferentially suggested that the rest of the case would be public. He thought it desirable that people should hear of the act and its purpose and perhaps also that creditors should have the chance to know what was going on. By way of compromise the reporters were asked to withdraw while the full detail of the doctor's affairs was revealed, and were invited to return to the court when the arrangements were finally approved. The judge asked the press not to disclose the doctor's name and address. He had no power to order secrecy, but his confidence in the discretion of the reporters was not misplaced. The machinery of the act, carefully worked out in the Lord Chancellor's department, involves an official register being kept of all these schemes of arrangement; each county court will keep an index of the schemes which come before it and of the orders made thereon. Search of the index and inspection of an order are permitted on proper application and payment of a fee; but there seems to be reasonable protection against mere curiosity on the part of persons not legitimately concerned. Debtors and creditors may, if the adjustment officer agrees, be represented before him by solicitor or counsel; it looks, however, as if the adjustment officer, himself legally expert in these matters, may be relied upon to give the debtor all the guidance that he may need.

The Works Doctor

In an address on "Workmen's Compensation as it concerns the Works Doctor," delivered to the Advisory Medical Committee of the Industrial Welfare Society, Mr. H. Samuels[1] emphasised once more the misfortune of the divorce of compensation from accident prevention and rehabilitation. Something might be done to encourage individual employers by offering them a reduction of premiums in their compensation insurance where their rate of accidents is low. But, as he pointed out, this merit-rating has no special financial attraction; the employer's premiums are deducted from profits for income-tax purposes, so that a rebate on the premiums is of no commercial interest. Mr. Samuels briefly discussed the two essential elements in compensation liability—the "accident" and the chain of causation connecting the accident with the incapacity. There are complicated questions here. For instance, if a driver falls from a lorry and tuberculosis is afterwards diagnosed, and it is proved that there were signs of tuberculosis before the accident and that the fall brought the disease to light, compensation will be payable. Cases of neurasthenia and even suicide can be difficult. The workman, he reminded works doctors, has no statutory right to have his own doctor present at a medical examination arranged by the employer; but a refusal to be examined except in his own doctor's presence is not such obstruction as will exclude compensation. The examination must be at reasonable hours. A firm's doctor wanted a workman to be specially examined in hospital; the man refused; the court held the refusal justified because no time was specified for the length of his attendance at the hospital. Mr. Samuels mentioned the possible common-law liability of the employer for negligent treatment if a works nurse happens to carry out duties without supervision in some respect outside the scope of a nurse's ordinary work. He applied the analogy of Hillyer *v.* St. Bartholomew's Hospital. The hospital authority, it will be recalled, is not liable for the negligence of nurses acting under the instructions of a surgeon, but may be liable if the nurse is acting outside her duties as a nurse. It follows that an employer, having engaged a qualified doctor and properly trained nurse, ought to be careful to limit the latter's functions to activities appropriate to her training.

INDUSTRIAL DERMATITIS

Dr. P. B. MUMFORD (Manchester), who opened a discussion at a meeting of the Association of Industrial Medical Officers in Manchester on Jan. 31, analysed the attitude towards dermatitis of the worker, the chemist, the works doctor and the dermatologist and stressed the need for coördination of all their points of view. The referee who has the final decision is unfortunately often not a dermatologist and must base his opinion on the history given to him by the worker. Industrial dermatitis may be caused by fat solvent action, deleterious effects of soap, irritation by acid, alkali, or friction, the blockage of sebaceous ducts, allergic phenomena, or infection with monilia. But both worker and management must realise that unless the word "dermatitis" was qualified by the adjective "occupational" it did not count as an industrial disease. There can be no universal protective agent, but the ideal protective barrier must be elastic, adsorptive, must neutralise the irritant and if possible have a slightly acid reaction. It should also be immiscible with the vehicle

1. *Industrial Welfare*, July–Aug. 1941.

in which the irritant reaches the skin, have a greater preferential solubility for the irritant than the skin, lack de-greasing effect and penetrative and conveying power, and be easily removed. It should have a pleasant consistency, and not make the hands sticky or slimy. It should be cheap and free from commercial control. It would be difficult to find a substance fulfilling all these requirements. The five types in common use were: paraffin oils, fats, waxes and mixtures of them, tragacanth, agar and colloid mixtures, clay bases, oil-water emulsions and soap clays.

Dr. ALICE PETERS (London) said that *dermatitis in filling factories* is of two types. The first and larger group caused by the chemical explosives is a contact dermatitis. Its incidence is governed by the amount of contact, "freedom from exposure" intervals, and friction. The temperature of the work-room, sweating, maceration of the skin, and the presence of abrasions are secondary factors. The lesions are caused partly by chemical trauma and partly by allergic reaction, and may spread beyond the contact areas because of sensitisation. At first they are erythematous and later may become papular, vesicular, eczematous and lichenified. It is difficult to watch for new cases of dermatitis on the night shift, and as the incidence of the dermatitis tends to occur between the fourth and fifth day of contact with fulminate of mercury, and between the ninth and sixteenth day with tetryl, beginners should not be on the night shift at these times.

Cheiropompholyx is more common among TNT workers, and when it is severe appears as an erythematous, papular rash. It should be regarded as a manifestation of TNT dermatitis, even with obvious fungus infection. Proper washing and total removal from contact of affected workers should be insisted upon. Ointments should not be used when the worker could come in contact with tetryl or TNT. The use of 5% sodium sulphite and 10% sodium thiosulphate in soap is effective in removing tetryl and fulminate respectively from the skin.

Dr. A. THELWALL JONES (Widnes) in a paper on *occupational acne* discussed cases caused by handling chlorinated naphthalenes. Whether this disease is produced by a local irritant, or whether the irritant is first inhaled and then excreted through the skin, is still not known. The fact that there is often a latent period of some months between starting the work and the appearance of the lesions and that crops of lesions appear after removal from the irritation suggests that the action is a local one. It is certain, however, that the ultimate effect is a hypersecretion of sebaceous glands; the areas attacked are usually the exposed parts, particularly the face, but often areas underneath the shirt which are not properly washed are attacked. The so-called chlor-acne is not produced by chlorine itself and differs from acne vulgaris in that the skin is not greasy, there are more blackheads and the nose is commonly spared. The areas attacked of course are those which are rich in sebaceous glands; these are irritated so as to produce hypersecretion with subsequent blockage. The scalp is spared perhaps because the erector pilæ muscles are better developed in this area. It is said that the liver is affected; this of course will not be the case in acne vulgaris. As vapour alone is responsible to prevent the condition all fumes must be removed. Other methods of control consist in choosing workers who are not of acne age and who have not greasy skins, and in providing for washing facilities, frequently changed protective clothing and general cleanliness.

Dr. W. E. CHIESMAN (Runcorn), who discussed *skin injuries due to vesicants*, compared thermal burns with those caused by mustard and other irritants; in the former the burn is surrounded by a zone of leucocytes and the tissue destruction is complete as soon as the burn is inflicted. In mustard burns the burn has a margin of capillaries filled with altered blood and necrotic material. The burn is progressive for 3–4 days. Anti-gas ointment should be applied at once unless the skin is actually damaged. In an atmosphere of mustard gas the sense of smell becomes fatigued, so that the danger may not be quickly realised. In preventing the progressive effect of the vesicants the blister should be punctured but the skin should be preserved; compresses of amyl salicylate reduce the œdema and can be used for three or four days. The final ulcer might be treated with cod-liver oil or by other methods. Considerable success has been obtained by covering the lesions with perforated oiled silk with a dry boracic dressing over it.

BOROUGHS PLAN TYPHUS CONTROL

AT the suggestion of the Ministry of Health the London County Council and the metropolitan boroughs have discussed measures to control any epidemic of typhus which may break out in London. Isolation of cases will be undertaken by the L.C.C., who have already arranged for one of their hospitals to take cases, and will make further arrangements if necessary. The boroughs of Westminster, Chelsea, Fulham, Hammersmith, and Kensington have drawn up a joint plan which will not, of course, operate until cases of typhus appear. As a preliminary measure 12 members of the Kensington public health staff have been immunised against typhus, protective clothing has been purchased and personnel are being trained in the care needed when dealing with clothing from typhus patients and with contacts. Some young conscientious objectors who are willing to take part will also be trained.

The boroughs have agreed that the scheme and the staff operating it should be under the control of Kensington. Disinfestation of premises, articles, and persons, and temporary housing of contacts will be the responsibility of Mr. H. W. Walters, the Kensington senior sanitary inspector. The borough already has the premises and plant needed for the task, including a disinfestation depot with three steam disinfecting chambers for clothing and articles, equipment for sterilising, washing, and ironing bed linen, a cyanide plant where furniture can be deloused in welded steel vans and a delousing station where contacts can take baths. This last station, though large enough to serve in a small epidemic, would have to be supplemented in a serious outbreak by cleansing stations in the other boroughs. In Kensington some furnished flats are at present reserved for people who are temporarily homeless while their houses are being disinfected, and a resident caretaker is employed; in case of need these flats could immediately be used as a clearing house for typhus contacts. The borough owns two metal-lined vans—one for infected and one for sterilised material—in addition to the welded steel vans used for cyanide disinfestation. These would be adequate transport during the early stages of an epidemic; a survey is being made of vehicles in the other four boroughs which could be used if an outbreak became widespread.

If a case of typhus is diagnosed the medical officer of health will decide what disinfection is necessary and what contacts must attend for delousing, and will pass the information to Kensington by telephone. The van for infected material will go at once to the house, manned by a team wearing protective clothing. Bedding and clothing will be put into stout bags. Meanwhile the disinfecting staff will seal the openings and fumigate with sulphur or some other suitable agent. Notices will be posted on all entrances warning people not to enter. As soon as the team reaches the disinfestation depot the clothing from the infected house will be sorted, articles unsuitable for exposure to steam being sent for cyanide treatment. The team will then take off their protective clothing (which will also go to be sterilised) and will at once take hot baths. After disinfestation the articles from the house will be packed in clean bags for return to the owners, and next day the disinfesting staff will spray the house throughout with liquid insecticide.

Contacts to be deloused will be taken, in transport arranged by the M.O.H., to the cleansing station, where records of each case will be kept. Under the supervision of the staff there—all of whom will wear protective clothing—the contacts will take hot baths to which disinfectant has been added, and after receiving back their disinfested clothes will go to one of the flats in the clearing house to spend the night. Their only luggage will be such toilet articles as toothbrush and razor. Stocks of tea, sugar, cocoa, bread, cheese, jam, and condensed milk will be kept at the clearing house for their use, and more solid meals can be sent in from a British restaurant nearby. The caretaker of the flats will keep records of those admitted.

This scheme is thought to be adequate to deal with the initial stages of an epidemic and could easily be expanded to cope with a large outbreak. It has been difficult to judge what staff would be needed, but it is proposed that the disinfesting team should consist of four motor drivers, eight outside disinfestors (to pack and sort articles), four inside disinfestors (to fumigate and spray premises), and one superintendent; at the cleansing station there should be a superintendent and four men and four women attendants; and at the clearing house only the resident caretaker. All these people will be immunised.

In England Now

A Running Commentary by Peripatetic Correspondents

THE school had broken up for the Christmas holidays and the boys in the half-light were waiting for the buses. A prowling master found some of them smoking and told them to report back to their house-masters for execution. They missed the bus and the train, and kept us waiting for three and a half hours on Paddington station. In coloration the damage almost came up to the mandrill standard; eight lines showed a fair attempt at close parallelism. Two months before in a patient with a long-standing pruritus I took 10 c.cm. of blood from the arm and injected it into his buttock. It did him a power of good. I think Nature budgeted for a certain amount of regular bruising. Except in this way I am sure the thrashing did one boy no good at all—on the contrary. It was so manifestly a silly, disproportionate, and unseasonable punishment. He is 16 and within limits can smoke what he likes in the holidays. I daresay he has averaged about two a day. Schoolmasters, like A. Hitler, suffer from a relative omnipotence, but I don't think they should be so omnipotent as to be able to reverse the Mosaic Law and visit the sins of the children on the fathers even unto the third and fourth hour on Paddington station.

* * *

If this war goes on much longer the standard of medical students, and therefore of medical education, is going to decline. The last two years have certainly confirmed the fears of those of us who saw from the beginning the defects of the present scheme whereby medical students are exempt from military service. No-one will question that an adequate supply of fully qualified doctors is necessary for the Services; where some of us differ from authority is on the means by which this aim can best be attained. What is happening now is that the flower of our youth are going into the Services as soon as they come of military age, either from school or after one or two years at the university. Whatever the calling-up regulations, no self-respecting youth likes the idea of spending the rest of the war studying for a profession while his contemporaries are fighting in the Middle or Far East, and it is going to take strong arguments to make him believe that he is best serving his country by leading a life of comparative comfort and security as a medical student. There are probably a few skrimshankers who see in the reservation of medical students an opportunity of evading all responsibility, unpleasantness and risk to life—but I have had practically no experience of these because our medical school has more applicants than vacancies. The effect on the ordinary youth, however, is becoming gradually serious. He can begin by reasoning that he will serve his country by continuing his medical studies—if he were not doing so the Government would no longer reserve him—but when he sees all his contemporaries in uniform, hears how the war is progressing and discovers the inevitable attitude of strangers who only see a healthy young man in civilian dress, doubts creep in. He finds it increasingly difficult to concentrate on his work, spare-time service in the Home Guard seems impracticable, and in the end he does scant justice to himself, his work and his country. The inevitable is already happening: the more enterprising students are leaving to join the Services. No obstacle can be put in the way of junior men, but with those nearing qualification some remonstrance is indicated. One student who approached me recently for my advice felt he could no longer continue with his studies—he must go into one of the Services. "All honour to you," was my reply; "but before coming to a final decision just consider this point: you tell me that it will take six months to complete the training for the particular branch you are proposing to join; in another nine months you will be qualified and therefore able to join the Services as a fully qualified medical officer. If you give up medicine now it will take six years to train whoever replaces you here. In other words, in order to be able to satisfy your praiseworthy ambition of serving your country three months earlier you are prepared to deprive your country of the services of a much-needed medical officer for six years." He had never thought of it in that way; but he did subsequently, and now he is getting down to work as he has not been able to do for months. I have not the slightest doubt that in nine months he will have qualified.

My solution of the whole problem is, like all paper-schemes, simplicity itself. Conscript every male at the appropriate age and second the necessary number for medical studies. Keep them in uniform, make them attend regular drills during the week, exercises at the weekend and large-scale manœuvres for 2–3 weeks each year. In this way you will inculcate military discipline, keep the men physically fit, and teach them how to use a rifle or tommy-gun. The King's uniform will preserve and even enhance their self-respect. Their studies will be interrupted less than they are at present and the country will have at its disposal a useful body of efficient, keen and highly trained young men instead of a rather dissatisfied, untrained collection who could do little in an invasion. To put medical students into uniform would certainly be a move in the right direction.

Otherwise we are faced with a reversion to the methods of the last war, whereby medical students were recruited as ordinary combatants and subsequently released to complete their studies when medical personnel became scarce. In my experience men who qualified under that regimen are not inferior in any respect to their colleagues who qualified before or after that war; in many ways they are better doctors, partly because they were of the type who volunteered for active service at the earliest possible moment, partly because their experience in the Army produced a more mature and experienced outlook on life. That the present system is failing is suggested by recent final examination results which show a definite fall in the standard expected. Conditions of work may have been difficult, but if you grant your medical student exemption from military service and do not restrict the period necessary for qualifying you have no right to lower the standard.

* * *

One reason why my occasional afternoons with a shotgun afford me so much satisfaction is that I never know, until almost the last moment, whether I shall be able to get done in time for them or not. As a rule, I shoot with a colleague who practises eight miles away, one of those conscientious country doctors who rises at cockcrow and works far into the night so that he may shoot in the afternoon. "After all," he says, "you can see patients by artificial light when you can't shoot." When I ring him up he is slow to answer the telephone and greets me with all the defensive surliness of an overworked and single-handed G.P. anticipating yet another late call. "Yes, what is it?" he grunts. "It's all right," I answer, "I was only wondering if there was any chance of your getting off for a couple of hours to-day?" Instantly his surliness gives way to good humour. "Yes, I think so," he says, not very doubtfully, "come over about two if you can. I'll meet you at the tumbledown cottage." Sometimes, early in the season, they hunt us down in a rootfield or a clover arrish with the unexpected sudden call, in which case we have to swap our guns for forceps and the chloroform bottle; but we contrive to pick up our guns again if we finish before the light fails. At this time of year we walk knee-deep through miles of wet bracken with two beaters and a small boy who has not yet returned to school and is collecting cartridge cases for salvage. Taffy and Beauty, the two hard-working spaniels, weave in and out in front of us. Taffy, stricken in years and lame from a badly mended broken leg, hunts more slowly than Beauty, but he is more thorough, less shy of them "brimmles" and, like the bed-bug,

gets there just the same. At half-time on Saturday the score was 3 rabbits all with my colleague, despite a bad start (a double miss), showing slightly the better average: 3 for 7 shots as against my 3 for 8. In the second half, however, he could do nothing wrong and ran right away from me. The final score was 13 rabbits and a woodcock, his share being 9 rabbits and the bird for 16 shots, no mean performance. With a mere 4 for 12 I had to sing pretty small, especially when the senior beater remarked: "These yur rabbits is so big as 'ares; nobody niver didden ought to miss 'em." Big as hares or not, they don't hang about much.

* * *

The peripatetic who recorded some disconnected and curious observations a few months ago must have reminded many of similar interesting facts unsuitable for formal presentation. How many surgeons, for instance, have noted that fat people recover more rapidly and completely from fractures around joints than do their more elegantly silhouetted neighbours? Is it that the joviality associated with fat men extends to the body as well as to the mind, so that the reparative processes work more harmoniously? Or does a generous distribution of adipose tissue enable a greater number of blood-vessels to serve the injured structures, so that effusions, hæmorrhages and indurations are removed more efficiently? Then why do fractures of the shaft of the tibia unite and consolidate more rapidly in the winter than in the summer? Perhaps it is due to less ambulation imposed by the inclemency of winter. It is, no doubt, heretical in these days to decry "functional treatment" of fractures, yet many years observation and active participation in the treatment of these cases makes me wonder whether we are *quite* sure that unlimited ambulation is wise. Certainly very early ambulation should not be permitted on any account. No plaster cast, whether padded or skin tight, is capable of giving absolute immobilisation; the very nature of our tissues militates against it. Muscle masses are reduced in size by pressure as well as by disuse atrophy; anyone who has applied a tourniquet knows this well. Nor can the areas around the joints where the bones become subcutaneous be used to obtain a perfect grip. When we try to obtain it here we always cause pressure necrosis of the skin, which is a plaster sore. So perhaps the lessened activity in winter eliminates those tiny shearing movements which are too small to be appreciated but which interfere with and delay the union of fractures by rupturing the newly formed capillaries.

It is unfashionable to accept impressions in modern surgery, but they often spur us on to conduct a more scientific investigation. I have an impression that neither the amount of adipose tissue nor the degree of functional exercise, either under expert supervision or as common domestic duties, employed in the treatment of a Colles fracture determines whether on the removal of the plaster the wrist will be freely movable or stiff. A few weeks ago I remarked to my secretary at the fracture clinic that nearly every wrist had an excellent range of movement immediately the plaster was taken off. I said "It has been like this for some time now; two months ago they were stiff and in a short time they will be stiff again; they always go in periods like this." Sure enough within ten days nearly all the wrists showed this inexplicable stiffness which is severe enough to warrant sending them to the massage department for physiotherapy. Factors such as the severity of the fracture, the anæsthetic used in reducing the deformity, the type of plaster (slab or complete), the weather, the length of immobilisation, the amount of use given to the arm and the degree of coöperation by the patient do not seem to have any connexion with the phenomenon. It is not the infrequent so-called atrophic change. Nor can I find any evidence that pseudo-Volkmann's contracture is in any way connected with it. In fact, I can't explain it.

ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION.—An examination for the Gaskell medal and prize of this society will be held on May 4 in London and other centres. The oral examination will be in London three weeks later. Candidates should give notice of their intention to compete to the registrar of the association at 11, Chandos Street, London, W.1, if possible not later than the middle of March.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M.P.

THE Army Estimates for 1942 were introduced on Feb. 19 by Captain Margesson, who has since been succeeded as Secretary of State for War by Sir James Grigg. Captain Margesson's statement covered a period during which there have been six campaigns—in Libya, East Africa, Greece and Crete, Iraq and Syria, and the Far East. In all of these campaigns the health of the Army has been good and the medical services have worked efficiently. This also applies to the contingents of our allies, the Free French, Poles, Czechs and others as well as to ourselves. The medical service of our Russian allies is, of course, distinct from ours and we have not as yet, on the medical side, got into very close liaison with them. But the great help being sent to Russia in medical supplies is an earnest of our wish to be in the closest relations.

The Secretary of State for War did not, in his original statement, refer to the Army Medical Service, but he gave the proportion of casualties suffered by troops from the United Kingdom in comparison with those from the Dominions, from India and elsewhere. Our troops made up about half the total number and casualties fell on our troops far more heavily than on any others. Of every 100 men killed or wounded in the land fighting since the beginning of the war up to January, 1942, about 70 have come from this country.

Sir Francis Fremantle's survey of the medical aspect of the war began with his experience as assistant secretary to the departmental committee of the War Office which advised Mr. Brodrick, as he then was, on the reorganisation of the Army Medical Service. Another datum line in the debate was a quotation from Wolseley, who in 1886 wrote: "The sanitary officer as a general rule is a very useless functionary. In future, so long as this fad continues, my recommendation is to leave him at the base." The result of this policy was 58,000 cases of enteric in South Africa out of an average army strength of 208,000, with 8000 deaths and only 7000 deaths from casualties killed in action. In the 1914–18 war there were only 7500 cases of enteric and only 266 deaths.

Sir Francis thought the War Office took the medical services too much for granted and still looked on them as though their function were only to treat wounds in the field. He drew special attention to the psychoneuroses which were stated to be the cause of 15% of invalidings from the service. Sir Francis also raised the question of the medical service of the Home Guard, but no clear reply was given because, as yet, no clear policy has been formulated. The two alternatives are to treat the Home Guard as ordinary infantry units and attach medical officers to battalions, or to allocate medical services to the Home Guard on an area basis, doctors working in the area in which they normally practise. Both methods may be required, but the area basis is more generally applicable in rural areas such as the Eastern counties where it has been in operation since the Home Guard was formed.

Dr. Haden Guest, after rebutting the slanderous accusations which have been made against ATS and other women's services, raised the question of the hygiene function of the RAMC. The most important duty of the medical service was to see that men keep well and that the conditions of their lives are as good as they can be. He drew attention to the close link between the C.O. of a unit and the M.O. in maintaining not only health and fitness but morale. The main point of his speech, however, was to draw attention to the work of the Shakespeare Committee which was appointed to determine priorities in the allocation of medical personnel as between the Services, the EMS and the civilian needs of the community. The committee has now reported and a regional organisation has been set up.

Sir Edward Grigg, under secretary to the War Office, in his reply said that the Army now had sufficient doctors and it was realised that the civil population must not be starved of doctors. Dr. Haden Guest asked whether it was necessary to keep the Shakespeare Committee in being as a "fifth wheel of the coach" as it had now done its excellent fact-finding work. It was

suggested that an executive committee of the medical heads of the three Services and the Emergency Medical Service, together with the chief medical officer of the Ministry of Health, the secretary of the Central Medical War Committee and representatives of private medical practitioners under a lay chairman could do all the work. This liaison committee, with all the facts and executive authority at its disposal, would save correspondence, paper and above all time in making decisions. Sir Edward Grigg said that the War Office would bear the suggestion in mind as it was very much to the point.

The health of British troops contrasted favourably with that of enemy prisoners, among whom dysentery, typhoid and other diseases are prevalent. There is only one feature of the health of the troops which is not good—some 80% require dental treatment. But whether this should be regarded as medical treatment ordinarily so defined or preventive treatment the Under-secretary did not say.

A point raised by Sir Ronald Ross was not answered but remains an important interrogative point. Can anything be done about disabilities involving discharge from the service which are held to be "not attributable" to such service? Under Workmen's Compensation law compensation would be paid. Could there, Sir Ronald asked, be some appeal to an independent tribunal? That would mean in effect the appeal tribunals of the House of Lords as they were set up after the 1914–18 war. The matter is being considered.

QUESTION TIME

Medical Man Power

Sir LEONARD LYLE asked the Minister of Health how many doctors had been released from the services to continue civilian practice under the system described on Feb. 5.—Mr. E. BROWN replied: I have not the complete figures for the whole time this system has been in operation, but during the last four months the Central Medical War Committee has recommended the release of 36 doctors from the Services to private practice. The release of all these doctors has not yet been effected, but only in 4 cases have the Service departments found it impossible to release them.—Replying to a suggestion that the Services might call up doctors for a short period of training and then release them, Mr. BROWN said that he was afraid that the supplementary question over-simplified the problem. He assured Mr. RHYS DAVIES that the services of eminent alien doctors now in this country were being utilised.

Replying to a further question Mr. BROWN said that the calling-up of civil doctors had increased the average number of panel patients per working panel doctor, but in view of the connexion with call-up statistics it would not be in the public interest to indicate the extent of this increase.—Sir L. LYLE: Does it not indicate that a serious state of affairs may arise in regard to the health of the civil population which will hold up production and our war effort?—Mr. BROWN: There is a difficult situation as regards medical man-power, and that is why the Shakespeare committee is sitting to determine priorities as between Service and civil needs.—Sir F. SANDERSON: Is it not a fact that the general conditions of health during war-time are higher than during times of peace?—Mr. BROWN: That is a rather wide and sweeping statement.

Anti-typhus Precautions

Lieut.-Commander R. L. TUFNELL asked the Secretary of State for War if arrangements were being made for the inspection of Oflag VI B, where the conditions were very bad, with a view to some improvement being effected; and whether in view of the danger of the outbreak of an epidemic, of typhus or some similar disease, as a result of the bad conditions, he would consider sending supplies of anti-typhus serum to the camp.—Captain H. D. R. MARGESSON replied: This camp has been visited four times since October by either the International Red Cross Committee or the Protecting Power. The most recent visit was by the Protecting Power on Jan. 20, but a report on this visit has not yet been received. A certain amount of improvement in the conditions at Oflag VI B has, however, certainly taken place during this period; in particular brick huts are being built for the accommodation of prisoners and overcrowding has been reduced by moving a number of officers to other camps. Medical supplies for the prevention and treatment of typhus have already been sent to Oflag VI B by the British Red Cross and some typhus vaccine has been sent to the International Red Cross Committee for the inoculation of British medical personnel in those camps where the International Red Cross Committee consider it necessary. In addition the Protecting Power has reported that a formal assurance has been given by the responsible official of the German general staff that all measures for preventing the spread of the typhus epidemic have been taken. The precautions which have been taken in this country against typhus include a close watch by medical officers at ports and airports; the organisation and training of special mobile diagnostic and sanitary teams; arrangements for confirmatory diagnosis by experts; plans by local authorities for prompt isolation, hospital treatment and supervision of contacts; and a general intensification of delousing and cleansing of verminous conditions, for which local authorities have recently been given additional powers. (Mr. BROWN replying to Mr. W. LEACH.)

Conditions in the Pottery Industry

Mr. R. D. DENMAN asked the Minister of Labour the death-rate from silicosis in the pottery factories, in which he had approved the increase of hours of work for young persons under 16 years of age to 53 a week.—Mr. ERNEST BEVIN replied: For the three years 1938–40 the average number of deaths from fibrosis of the lung (including silicosis) among persons who had been employed in the pottery industry was approximately 52, and the average age at death was between 59 and 60. I am advised that silicosis usually takes many years to develop and that the deaths now occurring are largely attributable to conditions which prevailed in the industry long ago, before the regulations were strengthened and various improvements made.—Mr. DENMAN: Do not increased hours of work mean an increase in danger?—Mr. BEVIN: I think that the way to treat silicosis is to make industrial conditions such that it cannot arise.—Replying to Mr. RHYS DAVIES, Mr. BEVIN said that he could not say whether there had been an annual increase or an annual decline.

Mr. DENMAN asked the Minister what steps, under section 99 of the Factories Act, 1937, examining surgeons were taking in respect of young persons under 16 years of age employed for 53 hours in pottery factories.—Mr. BEVIN replied: This section requires young persons under 16, on entering employment in a factory, to be examined by the examining surgeon as to their fitness for that employment. It does not require a further examination if the hours of work are changed. The inspectorate will, however, keep a special watch on the employment of young persons under 16 in potteries for more than 48 hours a week, and the position will be reviewed in three months' time.

Qualification for War Pensions

Mr. I. C. HANNAH asked the Minister of Pensions whether a man passed into the Army A1 who subsequently broke down in health and was discharged was automatically entitled to his pension.—Sir W. WOMERSLEY replied: The disability must be certified by my medical advisers to be either directly attributable to service or to be, and remain, aggravated to a material extent thereby. Where, in a man definitely passed as fit on recruitment or mobilisation for war service, effective service is found to have caused a degree of aggravation in a previously existing condition, the fact of discharge resulting from that condition would justify me in regarding the aggravation as material and thus bringing the case within the scope of the Royal Warrant. There are, however, some cases in which it is not possible to certify that service has caused any worsening.

National Health Insurance

Replying to a question Mr. BROWN gave the following NHI figures for Great Britain for 1940:

Persons insured under the National Health Insurance Acts at the end of 1940	22,300,000
Total of NHI contributions paid during that year	£30,700,000
Weekly amounts of contributions of—	
employers	£300,000
workers	*£290,000
State contribution	£7,300,000

* Includes payments of voluntary contributors.

The State contribution represents a seventh of the amount expended in 1940 on benefits and administration for men, and a fifth for women.

Employment of Married Nurses

Mr. DAVID ADAMS asked the Minister of Labour whether, in view of the urgent need for nurses in many hospitals in the country, it was intended to direct fully qualified married nurses without children to take up this form of employment.—Mr. GEORGE TOMLINSON replied: In the case of married nurses, as of other married women, proper account must be taken of their domestic responsibilities. Subject to such

responsibilities, I feel sure that married nurses in general are prepared to make their services available but, if necessary, the Minister would be prepared to issue directions.—Mr. ADAMS: Is the Parliamentary Secretary aware that a serious situation now prevails in regard to the shortage of nurses? While it is true that some married nurses have volunteered, is he aware that large numbers are declining to volunteer, and in view of the urgency cannot directions be given as suggested?—Mr. TOMLINSON: That is not the responsibility of my department.—Mr. G. BUCHANAN: Would it not be better to see that the conditions of employment are first made more attractive?

Wheatmeal Bread in British Restaurants

Sir ERNEST GRAHAM-LITTLE asked the Parliamentary Secretary to the Ministry of Food whether he would arrange for the exclusive supply of natural wheatmeal bread in British Restaurants under his jurisdiction, as the Home Office and the Ministry of Health had taken this action in institutions under their control.—Major G. LLOYD GEORGE replied: Local authorities have been asked to provide wheatmeal bread at British Restaurants. It is being supplied at the majority and exclusively at some. The Minister sees no reason to go further than this at the present time. As regards the last part of the question, I shall be obliged if he will furnish me with particulars of the institutions to which he refers.

Exemption of Women Doctors and Dentists

Captain G. S. ELLISTON asked the Minister of Labour whether he would amend the Employment of Women (Control of Engagements) Order, 1942, made under the Defence Regulation 58A, to secure for doctors and dentists the same exemption as was allowed to nurses, teachers, &c., and thus avoid unnecessary disturbance of the established customs of the medical profession in regard to the filling of appointments and the arrangements now in operation by the Central Medical War Committee.—Mr. BEVIN replied: After further consultation with the Minister of Health I am amending the order as suggested.

Public Health

Experiment in School Feeding

IN a North Middlesex secondary school of 480 girls, a small experiment with the Oslo meal type of school dinner has been tried out since September, with success. An average of 15–20 VIth, Vth and IVth form girls stay daily. Their ages are 13–17, and their home circumstances vary from good to straitened, so they are a representative cross-section of the school.

The first Oslo meal was a temporary expedient when the dining-hall was full, and a few girls stayed—with amusement and resignation—to a meal of cheese, salad, brown bread, baked potatoes, rusks and apples. They were surprised to find how nice it tasted, and how comfortable they felt in the afternoon. The experiment was talked about and a lesson on the Oslo meal given to each class. Now the Oslo group come eagerly back after the holidays, saying how much they have missed the meal. They feel they are pioneers and are keen to spread the idea, and convert mothers, aunts and neighbours. The staple foods are salads in great variety, wheatmeal bread and vitaminised margarine; these are supplied ad lib. About 2 oz. raw green vegetable and 2 oz. other vegetables make an average portion; 4–6 oz. bread and 1–1½ oz. margarine is usually eaten per head. Milk, ½ pint, is taken daily, and there are always some hard foods, such as rusks, available to chew. Protein foods served are grated cheese, sardines, liver paste (freshly prepared, after 5 minutes cooking and served as Danish sandwiches), cold fried or baked herrings, cold sausages, galantines, and salt cod as a mayonnaise with cod-liver oil added. None of these foods has proved difficult to obtain. Occasionally cold scrambled (dried) egg on 'Marmite' toast is served as a great treat.

In winter, hot soup and jacket baked potatoes are added to the menu; extras are small dishes of radishes, sliced onion or leek, celery and carrot sticks, watercress, 'Bemax,' a simple salad dressing, or a glass of vegetable juice served as a cocktail. "Afters" are more of a problem. Something sweet is keenly appreciated. Malt biscuits (using malt, whole meal and oatmeal flour) and malted home-made rusks are favourites; little jam turnovers, with wheatmeal flour, or apples, sultanas or prunes—dried or soaked—are usually given. The rule is "protective foods only served" and cookery recipes have to be made to fit. Soups are vitaminised with grated vegetables, chopped parsley and marmite added at the last moment. All outer leaves and stalks of vegetables are washed and chopped, boiled up quickly just before serving and added to the soup. Very little is wasted. An average meal contains half a day's protein ration and has a calorie value of 1000–1200. Vitamin C is estimated at 55 mg. and vitamin A 1100 international units. For vitamin D we rely on herrings, sardines, salt cod, liver, cod-liver oil and margarine. Iron and calcium foods are usually well represented. As most of the girls have a re-heated dinner when they go home from school, protective foods are their greatest need.

The meals are prepared in the cookery classes by the girls themselves and served in the kitchen. Senior classes prepare the salad plates. A typical one is a fish plate with small portions of herring, sardine, salt-cod mayonnaise, shrimps or fried cod's roe, with cress and tomato and grated carrot and swede. Another is a vegetarian plate with beans and mayonnaise or a brown sauce, and rissoles made from a well-known brand of vegetarian food or pulses, bemax and green salad and cress. The advantage of salad plates is that new ideas can be tried and the children can taste a variety of foods and decide how much they like them. Where a food is disliked by some children the waste is not large, and in practice it is usually eaten up by the others, unofficially. The aim is to increase their repertoire of dishes, and give them the idea that food can be an adventure. They are encouraged to discuss their food, why they are eating it and what they like and dislike. If they do not care for a food alternative methods of serving it are tried until they are satisfied.

Favourite salads are those with shredded raw cabbage, rather than lettuce; red cabbage and savoy are popular and so are raw turnip tops, raw swedes, beetroot, carrot—cooked or raw—celery and turnip. At first small quantities of salad were served: grated carrot and cresses and celery, and a little raw cabbage. Gradually the range was increased until the children became interested. "What did you have today?" inquire the others, as the Oslo group come out. "Is there any left?" is usually the next question. The success of the salads is remarkable. We are always assured that children will not eat them, but the shortage of fruit, especially of oranges, seems to have created an unconscious need for "protective" foods and the children are surprised at their own liking for salads. "I never used to eat it," they often say. A good deal depends on the serving. Bright colours, careful seasoning, and arrangement make a dish look and taste attractive. A salad must be blended, with soft and crisp textures mingled; too many crisp vegetables are tiring to chew. Cabbages and sprouts must be finely shredded. Vegetable juices poured over can make the protective value more concentrated.

The meal is served in the school kitchen under the friendly management of VIth and Vth form girls. The children prepare it, serve it, eat it and clear the meal away afterwards. They manage their own meal entirely and social pressure is exerted on any newcomer who fusses about not liking brown bread or salads, or doesn't fancy raw beetroot, or cauliflower sprigs or a red soup. The group remains unimpressed. The price of the meal is 6*d.*; usually the cost varies from 4½*d.* to 5½*d.*; any surplus is spent on stores or extras. Little is spent on fuel and nothing on labour. Preparation is simpler than in ordinary catering. Soup is easily made; shredding and grating take time, using ordinary household graters, but this gives children good practice in handling tools. Biscuits, oatcakes and rusks are made in quantity by afternoon classes and stored in tins. Most of the meal is prepared well ahead of serving time, but salads are seasoned and arranged within the last half-hour because they lose crispness on standing. There is no last minute rush to serve and cook, and kitchens remain cool and orderly. Apparatus is simple: a boiler and mashing sieve for soup, a mincer, graters, sharp knives, an oven, a frying pan and a steamer for galantines are the chief needs. Staff can be untrained, but a capable dietitian-cook is needed to act as forewoman.

Letters to the Editor

SURGICAL INSTRUMENTS FOR RUSSIA

SIR,—I should like to thank my colleagues who sent instruments and appliances in response to my appeal for the use of surgeons with the Russian armies. The response has been very generous; some two hundred parcels were received and the value of the gifts amounted to at least £3000. When the names of the donors have been available individual acknowledgement has been made, and Madame Maisky has herself insisted on sending a personal note.

The need continues and if any of my colleagues still have surplus instruments they would be most gratefully accepted.

ALFRED WEBB-JOHNSON,
President, Anglo-Soviet Medical Committee.

c/o. The Royal Society of Medicine,
1, Wimpole Street, London, W.1.

RELAPSING FEVER

SIR,—The discussion concluding the interesting account of a case of relapsing fever by Dr. Stannus and Dr. Bendit in your issue of Jan. 24 may possibly leave a wrong impression. One of the most striking features of the louse-borne form is the variation in the severity of the disease, not only as it affects individuals but also in the proportion of severe cases that occur in different epidemics. The number of relapses appears to have no bearing on the differential diagnoses and varies in the louse-borne disease from 2 to 4 or 5 or more. There is however no definite evidence that the case described was not one of ordinary louse-borne relapsing fever, and, in view of the danger of the importation of louse-borne diseases at the present time, cases of relapsing fever coming from Europe should be regarded as louse-borne and disinfestation of the patient and contacts carried out.

Ministry of Health, S.W.1. MELVILLE D. MACKENZIE.

THE PREMEDICAL CURRICULUM

SIR,—As a result of my teaching experience in the medical school and department of zoology in King's College, Newcastle, as well as from my contacts with teachers in several other universities, I have become convinced of the need for radical reform in the methods of teaching premedical subjects. It is agreed that students should be instructed in the elements of biology, physics and chemistry but the matter and method are mainly left to the university departments concerned. Many students and qualified medical men, however, consider that these premedical scientific subjects, as taught, are largely irrelevant to medicine; they fail to give that general background of scientific culture which should be their main object. The medical schools, though mildly concerned over the lack of general background displayed by their students, have not made a determined effort to formulate a remedy. They have been content to take the student as they find him and to make the best of a bad job. The scientific departments consider the interests of medical students as subordinate to those of their own, and have given too little thought to making their subjects an integral part of medical education. The average student regards the premedical subjects as a kind of formula to be mastered before he can gain entrance to a medical school, and he acquires the impression that medicine is not, thank God, a science.

Surely whatever is taught him should leave him with a clear impression of what the subject as a whole is driving at, however much of the detail he forgets later. At present he is treated as an intending specialist and presented with uncoördinated details the general implications of which are not discussed. But necessary detail can always be more easily absorbed if, from the very start, the wider significance of a subject is made clear. Moreover, since medicine is in part applied biology, and biology entails study of the application of physics and chemistry to the problems of life, the student should be impressed with the interdependence of the three premedical subjects. The three courses should be planned together as an integrated whole, perhaps even in the form of a general science course. This might begin with the theme of the circulation of matter and energy, whence the student could be introduced to the laws governing the transformation of different forms of energy and to the part played by living organisms in these processes. The chemistry of oxidation and reduction, of hydrolysis and condensation, and of the chemical elements concerned would find a natural place in this scheme, and the study of photosynthesis, respiration and fermentation would become an integral part of the whole. On this foundation, which could be elaborated to a suitable extent on the physical and chemical side, the biological superstructure could be built, and should finally lead to the consideration of man, his biological peculiarities and his place in the general scheme. Man's exploitation of the natural flux of matter and energy by agriculture and industry would naturally be introduced as one of his characteristics. Finally, though not necessarily at the end but rather at several appropriate points, strong connecting links could be forged with medicine. In a general survey of the manner in which chemical, physical and biological principles are applied in medicine the student would gain an idea of the whole field which he will subsequently cover.

High Wycombe. L. C. BEADLE.

WAR-TIME NURSERIES

SIR,—Many of your readers will have much sympathy with the arguments of Dr. Gilchrist and Dr. Menzies (*Lancet*, Feb. 7, p. 185). A good case can certainly be made out for a mother looking after her own children, but the difficulty is that many of these mothers do not want to stop at home to do so; moreover, the young wife who has recently worked in a factory is often a very efficient and valuable worker. The war-time nursery is an alternative to some decrepit grannie with bleared eyes and septic teeth. I hasten to add that the ordinary energetic grandmother whose dentures are beyond reproach is usually herself a worker and does not wish to give up her work in order to mind her grandchildren. Thus from the child's point of view the war-time nurseries seem to be carrying out a desirable function; but the second serious argument is that of the labour wasted in looking after them. I should like to suggest that the scheme put into practice by Dr. James Fenton in Kensington is an excellent solution which might be copied elsewhere. Relays of the young personnel from adjacent first-aid posts are working in four-hourly shifts as pupils in the nursery. By arrangement with the National Society of Day Nurseries these girls are being trained for the nursery nurse's diploma so that when the war is over they will be ready to take up a useful career. As far as the work of the nursery is concerned, they are proving ideal and are putting all the enthusiastic devotion with which they worked through the blitz into their care for their charges.

In Kensington the war-time nurseries are thus carrying out a triple function in freeing young mothers for the war effort, giving proper care and education to their children and providing useful constructive work and a future career for the personnel of the first-aid posts. The character of the work seems particularly felicitous for these young girls who have spent so long in the necessary but abnormal atmosphere of "first aid" and "anti-gas" and to whom we owe so much A supply of trained nursery nurses will always be an asset to the nation; and if the girl marries she will have received a useful dowry in her training.

Kensington, W.8. VIOLET RUSSELL.

NOT SO STERILE LABELS

SIR,—It is generally recognised that the incidence of meningismus and meningitis following spinal analgesia has recently increased in this country. While some of these cases are probably due to chemical irritation of the meninges from the injected drug, others have been proved to be infective, and various causes such as contamination of the water-supply have been blamed. The purpose of this letter is to point out a possible source of infection which seems to be insufficiently recognised. Before the war manufacturers used ampoules with particulars of their contents etched on the glass. Such ampoules could readily be sterilised. It appears, however, that the etching process is no longer available, and makers have resorted to gumming printed labels on their ampoules. It is, we believe, a common practice

to immerse these ampoules in spirit in order to sterilise the outer surface. We have found that after immersion for half an hour—a longer period than that sometimes employed—numerous bacteria can be cultivated from fluid in which the labels have subsequently been soaked off. If, therefore, an ampoule so treated is placed in the same bowl of sterile water as the spinal needles and syringes, it will contaminate them, and if the ampoule is held in the hand it may infect the anæsthetist's gloves. Exposure to formaldehyde vapour in a cabinet such as that used for sterilising catheters is apparently an effective method of sterilisation; but, since such a process is often impracticable, it would seem advisable to regard the outside of all labelled ampoules as frankly septic and make no attempt to sterilise them. They can be held in a sterile towel or gauze, their necks etherised, nicked with a sterile file and snapped off. The contained solution can then be drawn up into the syringe without fear of contamination. A few organisms may not matter in subcutaneous or intravenous injections; in intrathecal ones they may prove fatal.

Hill End Hospital. C. LANGTON HEWER.
LAWRENCE P. GARROD.

CORROSIVE STRICTURE OF THE STOMACH

SIR,—In reply to Mr. Joll (*Lancet*, Oct. 11, 1941, p. 439) I should like to state that partial gastrectomy has been performed for strictures, but authors who have had a relatively large experience in the treatment of burns of the stomach are still inclined to advise gastro-enterostomy rather than resection. In analysing 34 cases, V. Orator (*Zbl. Chir.* 1929, **56**, 514) states that corrosive strictures are unsuitable for resection. B. Petrov (*Sovet. Khir.* 1935, No. 6, p. 106) reports 41 operations for burns of the stomach: of 6 jejunostomies, all were fatal; of 31 gastro-enterostomies, 5 died; and of 4 resections, 1 died. He concludes "The operation of choice in pyloric stenosis from burns is gastro-entero stomy, not resection." Mr. Joll says that in his case there were no technical difficulties. Petrov states that in many cases operation is very difficult because of adhesions and severe shrinking of the stomach under the left costal margin. Here the transverse epigastric incision will probably give easier access than the longitudinal one.

Ventersdorp, South Africa. C. A. R. SCHULENBURG

CRUSH FRACTURES OF THE OS CALCIS

SIR,—The swing of the pendulum as it affects fashions in treatment is always worth watching. I read with interest the paper by Mr. Gray (*Lancet*, Jan. 24, p. 106) on the treatment of fractured os calcis. Lucas-Championnière did not publish his work on the treatment of fractures by massage and mobilisation till 1895—long after he had begun to practise it regularly. His teaching did not prove a success—first, because it was grossly abused, and secondly because it required constant supervision from the surgeon. Yet there was no reason to condemn the method because it was abused by a faulty technique. The pendulum then swung over to Böhler's treatment which, as practised in this country, only differed from the treatment given before the Lucas-Championnière method was advocated in the demand for perfect alignment. In earlier days the doctrine of "good enough" had held sway, and Arbuthnot Lane and Böhler did good service by insisting on alignment. The Lucas-Championnière treatment died from abuse, and Böhler's technique of unpadded plaster splinting will do the same. His method requires not only perfect reduction and fixation in plaster, but elevation until all swelling has disappeared. In England it would be impracticable at present to admit all patients with Colles's fractures, say, in order to ensure that the hand could be kept vertical until the fingers could move fully and no longer swelled when the arm was allowed to hang. Elevation is an essential part of Böhler's treatment, and omitting it has been responsible for immeasurable damage. Those with wide experience of fractures which have been treated in Böhler's way but without elevation realise the unnecessary labour, from a physical therapy point of view, and loss of time in recovery which result, and which are often totally out of proportion to the original injury. Perfection may ultimately come by combining the teaching of Böhler and Lucas-Championnière. The late Sir Robert Jones was content to use well-padded splints as a guard against undue pressure; not everybody can be trusted to apply a plaster splint to any fracture, especially if the cast is to be unpadded. This is a specialist job. Even when perfection is attained it will repay the practitioner and patient in this country (whatever may be the case in Austria) if the period of immobilisation is reduced to a minimum, and physical treatment started at the earliest possible moment; this often means from the outset, provided that technique is satisfactory.

London, N.W.1. JAMES MENNELL.

CONTROL OF RATS

SIR,—Your issue of Jan. 31 (p. 158) contained a valuable article by Mr. Hardy on the control of rats. The humanitarian aspect of any subject will not appear trivial to medical men, so may I call attention to the desirability of choosing humane methods whenever it is practicable to do so? Official advertisements have perhaps favoured the opposite choice by inculcating a kind of personal spite against rats—though to sensible people it will appear childish to speak as if the animals were intentionally harmful to mankind.

Fumigation with hydrocyanic acid gas or with carbon monoxide (in exhaust gas from motor-cars or tractors) is unquestionably humane. A good deal can be done by rat-proofing and destruction of breeding-sites, in the manner described by Mr. Hardy. The breakback type of trap is usually, though not infallibly, humane; it is much cheaper than the wicked gin trap, contains much less metal, and is almost as efficient. Cage traps should be of the kind that have a door at each end, so as to give a clear run, and should be inspected with the utmost regularity. Unfortunately all the available poisons are exceedingly inhumane, and there is a strong case for research to find a humane and effective poison.

284, Regent's Park Road, London, N.3. C. W. HUME, Hon. Secretary, U.F.A.W.

UNWANTED INSTRUMENT CATALOGUES

SIR,—Peripatetic correspondent in your issue of Jan. 17 (p. 87) suggests that instrument catalogues, weighing anything up to 7 lb., when not wanted, should be patriotically given to the waste paper collection. We venture to suggest unwanted catalogues should be returned to the publishing firm. The time, labour and cost of printing of these works is a serious item of expenditure, although the fact that they are distributed free of charge on request to members of the medical profession gives a different impression. This house receives many requests for copies of a catalogue to which it cannot accede owing to the activities of the Luftwaffe and the present impossibility of reprinting. The return of all unwanted catalogues would be appreciated.

London, S.E.1. DOWN BROS. LTD.

GINGIVITIS IN THE FORCES

SIR,—Mr. Coventry and I pointed out (*Lancet*, Jan. 31, p. 153) that military cases admitted to hospital suffering from gingivitis were found to be deficient in vitamin C, as judged by accepted standards. Since I investigated those patients I have confirmed my findings by other methods of assessment of ascorbic acid nutrition. We stated in our first letter that patients did not show clinical scurvy, but since then I have observed the frequency of associated symptoms which might be referable to vitamin-C insufficiency. These have been mainly lethargy, ready fatigue, malaise and irritability of temper. Further investigations indicate that low ascorbic acid values are by no means confined to cases of gingivitis. Other patients with no apparent gum lesion or manifest signs of scurvy gave low figures of ascorbic acid nutrition. If the patients studied reflect the general standard, then there seems to be a depression, lesser or greater, of vitamin-C nutrition in the Army. Whether the hypovitaminosis is of sufficient degree to need remedying is a matter for careful consideration and large-scale assays. My own opinion is that the men I examined had vitamin-C nutritional levels low enough to handicap them as soldiers and certainly to render them less efficient in combat.

FREDERICK STUHL.

Obituary

JOHN HARRY HEBB

KT. C.B., C.B.E., B.M. OXFD

Sir John Hebb, who died at Ronkswell Hospital, Worcester, on Feb. 15, in his 64th year, received his medical education at Oxford going on to the Westminster Hospital as university scholar. After qualifying in 1905 he was house-surgeon at the Westminster and house-physician at the Bethlem Royal Hospital. He then went into private practice, becoming assistant medical inspector of school-children for Oxfordshire. During the late war he served with the RAMC in the Mediterranean Expeditionary Force, reaching the rank of major and being awarded the O.B.E. On his return he joined the medical staff of the Ministry of Pensions, succeeding Sir Lisle Webb as director-general in 1933. At the time when he should have assumed office he was gravely ill, and although he was subsequently able to take up his duties there can be little doubt that the impairment of his health which resulted contributed to the ultimate breakdown under the stress of his responsibilities in the last three years. In 1928 he was created C.B.E., and in 1937 C.B. in recognition of his services with the Ministry of Pensions. In this latter year he was appointed hon. physician to the King, an appointment which he held until his retirement in 1941.

Elliott & Fry

In the summer of 1938 Hebb was called upon to organise the Emergency Medical Services under the Ministry of Health, to which department he was seconded for this purpose. The magnitude of the task was at once apparent, involving as it did the preparation of plans for dealing with an imminent declaration of war and the resultant treatment of casualties, and also a more elaborate and detailed scheme if, as happened, war was averted for the time being. At the beginning of 1939 to his responsibilities for the provision of adequate hospital accommodation was added the supervision of plans for first-aid posts throughout the country. But Hebb's superhuman energy was equal to the occasion. The clinical arrangements for special types of casualties—neurosis, head and chest injuries, orthopædic cases—the supply of instruments, apparatus and drugs, the design of folding beds and stretchers, the planning of ward huts with all their ancillary buildings, all these received his personal and unremitting attention. He never spared himself, and in 1940 he had an attack of coronary thrombosis from which he made a good recovery. Characteristically he ignored the danger signal, and when in 1941 he retired with a knighthood he took the post of medical superintendent at the new Ronkswood Hospital, Worcester, and was putting the final touches preparatory to the reception of patients when a second attack proved fatal.

Hebb had exceptional administrative ability, as was shown by his work at the Ministry of Pensions, and more particularly as director-general of Emergency Medical Services at the Ministry of Health. The success this service has had is largely due to his initiative and driving power; it was a job after his own heart and he threw himself into it body and soul. His genius for improvising in a few months a vast series of arrangements, which at the peace-time tempo would have taken a decade to complete, can be appreciated by those who took up the task when ill health compelled him to leave it. He exacted hard work from his staff, but he worked harder than any of them himself. His work was his life, and he died as he would have wished while still working for a coördinated system which may well have a profound influence on the hospital policy of this country for many years after the war.

DAVID ANDERSON MILN

M.R.C.S.; SURGEON LIEUTENANT R.N.V.R.

Dr. David Miln died in Malay on Jan. 20 at the age of 26, from wounds received in an air-raid. He was the only son of Mrs. Miln and the late David Miln, barrister, of Witcombe, Gloucestershire, and Forest Hill, London. He was educated at Alleyn School, Dulwich, where he won his colours for swimming and boxing. In 1934 he went on to the London Hospital with a Price scholarship and before he qualified in 1939 he had many prizes to his credit. After holding a house-appointment at his hospital he joined the R.N.V.R. in June 1940, and three months later he arrived at Singapore. To begin with, the comparative safety of his life and the routine which made up his work fretted him, but his letters to his mother show that he quickly decided that his contribution to the war must be to work hard at the job on hand and to seize his opportunities to study tropical medicine. He had started to learn the Malayan language on his way out and soon he could speak it fluently, while his enthusiasm and energy soon started "quite a number of hares running." He obtained permission to attend operations, post-mortems and outpatient sessions at the Singapore General Hospital and he "found it heaven to get back to hospital medicine after the minor rubbish" he saw all day. He also began to work at the pathological department of the hospital which had been planned according to a scheme instituted by Professor Turnbull, and Miln found he was soon regarded as a sort of unofficial representative of his hospital and was expected to be ready to quote the opinions of "the London pundits." Meanwhile his official work had also increased and he found being the doctor of 1200 Malays was interesting and worth while. He began to investigate cases of beriberi among them, and diagnosed his first case of leprosy. At the end of last year his interest and work centred more and more round malaria, and when after various wanderings he returned to Singapore it was only to attend an antimalarial course and then set out up-country to work as a malaria control officer. Shortly before his death he returned to report on a survey with which he had been entrusted and which he regarded as the most responsible job of his life.

IAIN ALASDAIR MACMILLAN BEATON

B.SC., M.B. GLASG., D.P.H.; LIEUTENANT I.M.S.

Dr. Iain Beaton, who died on active service in India, at the age of 28, was the elder son of Mr. Donald Beaton, of Kelvinside, Glasgow. He was educated at Hillhead High School and the University of Glasgow, where he graduated in science in 1934, and in medicine three years later. His first resident posts were as house-gynæcologist at the Western Infirmary and as senior house-surgeon at the Glasgow Royal Maternity and Women's Hospital. In 1938 he returned to the Western Infirmary to hold further house-appointment, and A. J. H., his chief, writes: "Beaton had had considerable 'house' experience and was more fully equipped than the usual house-surgeon. He was of an inquiring mind, and although quiet in his manner he never hesitated to ask for information to clear up a point that was obscure to him. His interest in his work and care in its performance leave a pleasant memory." Later Beaton was appointed medical officer at the Cleland County Hospital, Lanarkshire. Last year after taking his D.P.H. he entered the I.M.S. as a temporary lieutenant. He died from enteric fever at Rawalpindi on Jan. 9. He leaves a widow.

Lafayette

Messrs. BURROUGHS WELLCOME & Co. are issuing 'Quinizarin' in bottles of 100 g. and 250 g. The use of this compound as a diagnostic agent in the study of sweat secretion has been described in the *Journal of Neurology and Psychiatry* (1940, 3, 197).

Notes, Comments and Abstracts

CIVILIAN CONVALESCENT TREATMENT

J. OWEN REID, M.D. EDIN.
MEDICAL SUPERINTENDENT TO THE PRINCESS MARY'S L.C.C. HOSPITAL, MARGATE

FOR some time past lack of adequate convalescent facilities for civilians has caused concern. Many of the usual peace-time arrangements are no longer available. A public-health official recently informed me that "convalescence might be regarded as an unnecessary luxury in war-time." Nothing, I believe, could be further from the truth. In these days of increased mental and physical strain, when holidays are reduced to a minimum, when many people are working for long hours in factories, and when the normal comforts of home life are reduced, recuperation under skilled supervision is necessary to hasten the return of the sick to the bench and lathe. This could be fully supplied by the provision of convalescent hospitals. The principle has already been applied by the Army in their convalescent camps, and civilians, now sharing the front line, deserve equal benefits.

The words "convalescent hospital" embody a new conception of convalescent treatment which differentiates an institution so designated, and equipped for the purpose, from the multitudinous establishments of varying repute grouped under the traditional term "convalescent home." The prime functions of the convalescent hospital are to provide every possible form of medical treatment required by a patient from the moment he is fit to be moved from a general hospital, and to restore him to health in the shortest possible time. This would materially hasten the turnover in the parent hospitals.

ACCOMMODATION AND STAFFING

The convalescent hospital of the future should be situated in pleasant country surroundings or at the seaside, preferably on the outskirts of a small town, so that patients in their free time are not severed from civilisation. The sexes should have separate hospitals, and children should be treated in an institution set apart for them. It would, I think, greatly add to efficiency and ease of control were such hospitals limited to about 350 beds.

The buildings must be comfortably furnished, with ample accommodation for reading, writing and recreation. Various therapeutic units should be provided, among them a massage department of liberal dimensions. Patients always appreciate small wards containing 4–6 beds, because these confer a degree of privacy and enable friends, or similar types of patient, to be housed together. Adequate sick-ward accommodation is essential. Our experience at Margate showed that about a tenth of the patients admitted passed through the sick-ward at some period of their stay. A few extra beds for isolation must also be provided. The grounds should be attractive and provide adequate space for recreation.

Staffing must be on lines similar to those of a general hospital but the ratio of trained to untrained nursing staff can be lower. At the same time the wards must be adequately covered by trained staff, and it should be borne in mind that convalescence for patients does not imply convalescence for the staff. The hospital must be able to meet every modern therapeutic need but should not be called on to deal with acute surgery because patients requiring immediate operation can always be transferred to a neighbouring general hospital. A first-class massage department is indispensable, and must incorporate electrical treatment, diathermy, artificial sunlight, infrared therapy and remedial exercises. Classes for physical exercises must be formed in several groups so that patients may progressively graduate from the elementary to the more advanced. Such measures applied to chest diseases are beneficial; patients with heart disease and those with abdominal wounds, particularly hernias, can also be given a series of carefully graduated exercises. All such classes must be conducted by skilled instructors under medical supervision. At Margate, a policy of centralising all surgical dressings in a special department was found convenient, saving time in the wards and economising materials and instruments. All patients knew the hours at which they were expected to attend and there were no lengthy periods of waiting.

Throughout convalescence radiological investigations are desirable in many disorders and essential in some. For example, with diseases of the respiratory system efficient control of cases in the recovery stages of pneumonia, empyema or lobectomy often calls for repeated examinations, and the same is true of many diseases of other systems. The medicolegal aspect makes it advisable that all injuries sustained by patients should be X rayed immediately.

Patients should be dissuaded from taking medicines they do not need. This may be difficult, for the masses have an inborn faith in the bottle of medicine. Much of the convalescent hospital's success will depend on the culinary arrangements; diets should be suitable and meals attractive. Variety stimulates that keenness of appetite and enjoyment of food associated in the mind of the convalescent with the return to normal health. Dining-rooms must be warm and comfortable with separate tables seating six or eight. Food should be daintily served and service prompt and courteous. Patients on a special diet must be seated apart from the others. General supervision will be facilitated if patients occupy the same seats during the whole of their stay. This makes it easy to check attendances, which must be compulsory at all meals except afternoon tea. The day must not start too early. Breakfast should be about 8.15 A.M.—a late hour in hospital routine.

Entertainment is an important psychotherapeutic factor in convalescence, diverting the mind from infirmity of the body. Patients must never be allowed to become bored. An established but varied routine which fills the day while leaving the afternoon free is helpful. This applies especially to the evenings, when all patients must be within the precincts of the hospital and not wandering about the countryside. Concerts, cinematograph shows, games and an occasional dance provide a pleasant ending to a day which should finish with bed for all by 9.30 P.M. During the day much can be done to provide varied diversions. At Margate, we used to run charabanc excursions twice a week for most of the year and a steamer trip once weekly during the summer. Most patients enjoy a modern library and there must be a liberal supply of newspapers, periodicals and indoor games in the reading- and recreation-rooms. All such arrangements can be controlled by a competent recreation officer. Occupational therapy, in comfortable and suitable workrooms, must be encouraged. Interest can be stimulated by awarding small prizes, say once a fortnight, for the best articles in the various handiwork groups.

As much freedom as possible must be allowed provided treatment comes first. With afternoons free the patients are generally well contented. Irksome and petty restrictions must be avoided; at Margate, we had no rules but rather instructions for the guidance of patients. Such freedom restores not only a sense of self-reliance and responsibility, but helps to eliminate any subconscious desire for continued invalidism.

The closest possible liaison must be established between the convalescent hospital and the group of institutions it serves. Meetings and discussions between the medical staffs must be frequent and full notes sent and returned with every patient. Each hospital must work as part of a system entirely devoted to the restoration of health. It is to be hoped that a scheme on these lines will be seriously considered by those responsible for the present and future development of the hospital services in this country.

I am indebted to the Medical Officer of Health of the London County Council for permission to publish this paper. These observations are made from experience gained during the development of the council's policy of convalescent hospital treatment.

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES.—A meeting of this society will be held at 11, Chandos Street, London, W.1, on Saturday, Feb. 28, at 2 P.M., when Captain C. S. Nicol will read a paper on pyretotherapy by intravenous TAB vaccine in the treatment of gonorrhœa and non-gonococcal urethritis. The next meeting will take place on March 28, when Colonel L. W. Harrison will open a discussion on methods of enlightenment of the general public on venereal diseases.

HEALTH OF CAPE TOWN

WITH an equable climate, an average of 3000 sunshine hours a year, complete absence of local tropical diseases, and on the whole a well-to-do European community, Cape Town should be a healthy place; and so it is for Europeans. But it is a sorry picture that Dr. Shadick Higgins paints of the non-Europeans, usually classed as Cape Coloured who constitute just over half of a total population of 300,000. In his report for 1939–40 he says that 57% of the coloured deaths were under the age of 25, tuberculosis has become very prevalent and venereal diseases are rife. The general incidence of notified tuberculosis among the coloured was 7·08 per 1000, against the European incidence of 1·14 per 1000, and the disease seems to run a particularly rapid course in the coloured. In the year 3483 new cases attended for treatment at the venereal disease clinic and of these 2714 were Cape Coloured, making the incidence of treated cases among them 17·6 per 1000. Moreover, half the new patients were suffering from syphilis. Dr. Higgins shows how much social and economic conditions are to blame. Some of the coloured are skilled workers, but the majority are labourers, many of them earning under 30s. a week. Overcrowding and undernourishment are inevitable. To show the effects of overcrowding the tuberculosis officer points out that 55·8% of coloured contacts of tuberculosis examined had the same disease; and in a series of 81 cases of tuberculous meningitis an "open" case of tuberculosis had been in contact with the patient in 23. But great improvements were being made when the war began. Large council housing schemes for the coloured were being built in the "Flats" or suburbs, with low rentals and cheap transport. The native location has its own small hospital with nursing staff and medical personnel. Maternity and child-welfare organisations were well established and their services were being extended, and special nurseries for toddlers had been started. Undernourishment was being met to some extent by free milk and meals for the poor and the sale of state-subsidised butter, of which nearly a million pounds had been sold. The incidence of enteric fever in 1939–40 was the lowest on record and there were no deaths from measles or scarlet fever. The incidence of diphtheria too had fallen considerably, but there was still a striking difference in the fatality of European and coloured cases (3·1% for Europeans and 15·4% for non-Europeans). In spite of the overcrowding there were only 35 cases of cerebro-spinal fever. Dr. Higgins hopes that the low cultural standards among the coloured can be raised by extending education and adding other social amenities. He points out that there is no national health insurance scheme in South Africa for them. He has started using coloured health visitors and is impressed by the experiment. With a large hospital catering only for coloured established at Cape Town there are now facilities for the training of such coloured nurses and they will play an important rôle in future public-health work. The problems of the coloured of Cape Town are much the same as those which face medical officers of health in all native, Asiatic and other crowded communities, and Dr. Higgins's experience will repay careful study.

DOCTOR IN THE LIONS' DEN

ARMENIA, the first country to adopt Christianity as the state religion, in AD 302, is a country which has suffered wars and persecutions for many centuries. Situated between Europe and Asia, it has been attacked by Persians, Mongols, Romans, Saracens and Turks. The latter carried on the traditional persecution of the "infidel" Armenian Christians until after the last war. The recurrent massacres and atrocities perpetrated on the Armenians by the Turks exceeded in barbarity the pogroms of the Orthodox Russians against the Jews before 1917. Against such a background, general practice in Turkey by an Armenian physician was likely to be precarious; Dr. Avedis Nakashian, who has recorded his adventures in his autobiography,[1] found this out for himself. He was educated at the American Missionary College at Aintab and later studied medicine at Beirut, where he qualified in 1894. From then until 1922 he practised in Turkey.

1. A Man who Found a Country. Dr. A. Nakashian. London: Allen and Unwin. Pp. 279. 12s. 6d.

He made the most of his opportunities and being one of the few properly trained doctors in the country he was able to acquire plenty of surgical experience. He would set up his surgery in any town or village he visited in Eastern Turkey and rich and poor would flock to him for treatment. He took big fees from the rich but treated the poor free. He attended governors, sheiks, or bandit chiefs with equal readiness, but on several occasions, although he always steered clear of politics, he had to pack his bag hurriedly and flee to a more friendly locality. With the upheavals following the last war, culminating in the defeat of the Greek army in Anatolia and the burning of Smyrna, Dr. Nakashian decided that it was too dangerous for him to stay any longer in Turkey, so he made his way to America. There in 1924, after unhappy experiences on Ellis Island, he "mingled with the happy and free millions of New Yorkers, safe in the melting pot of Uncle Sam."

Dr. Nakashian's book is naively written and some of his stories show traces of oriental embroidery, but he gives an interesting picture of life in Turkey during the first quarter of this century. If one can read the doctor through his book, he is not only a competent surgeon, but has that sympathetic understanding of human nature which is the mark of the true physician.

ACUTE INTESTINAL OBSTRUCTION

IN his Honyman Gillespie lecture in Edinburgh on Feb. 19 Mr. K. PATERSON BROWN, F.R.C.S.E., discussed acute intestinal obstruction from the clinical standpoint, restricting himself to postoperative obstruction. Such obstructions, he said, are usually the result of adhesions, peritonitis, or a combination of the two. Those due to adhesions may develop soon after the abdominal exploration or be long delayed. In the former case obstruction is usually of the simple mechanical type, but when a considerable time has elapsed before symptoms appear there is a greater likelihood of a strangulation. When peritonitis is the primary cause paralytic ileus may set in, accompanied, in high obstruction, with rapid distension and colic, and copious vomiting. When the lower ileum is obstructed some absorption of digestive juices is possible and distension is more gradual; but there is increased intestinal secretion, and venous stasis leading to œdema of the bowel. Eventually a paralysis is imposed on the mechanical obstruction. Vomiting may be early but is often delayed until gross distension has developed. He explained that in both types there is great loss of water and electrolyte—in high obstruction by vomiting, in low obstruction by accumulation within the distended bowel. In high obstructions chloride loss is great, and hypochloræmia and alkalosis are added to dehydration. In low obstructions the chloride loss is not so great and ketosis may be added to dehydration. He did not suggest that a disturbance of water and salt balance is the only factor militating against recovery in acute intestinal obstruction but it certainly plays an important part in causing serious deterioration. Under normal conditions an individual loses each day 1000–1500 c.cm. of water in vaporisation from skin and lungs, a small amount from the fæces and 600–1500 c.cm. in the urine. It has been estimated that the surgical patient requires about 3500 c.cm. of fluid a day. In the postoperative phase it may not be possible to give any by mouth. The abnormal losses of intestinal obstruction must also be replaced, and this sometimes entails the administration of enormous quantities of fluid—10 or more litres in 24 hours. Replenishment of lost chloride is also vital and determinations of the plasma chloride concentration are helpful. He quoted the work of Bingham and Bartlett, who have suggested a clinical rule for estimating the chloride requirements: if the plasma chloride level is known, then for every 100 mg. that the plasma chloride needed to raise it to normal 0·2 g. of salt per 1 lb. of body weight must be given. If excessive sodium chloride is given, it may cause œdema; and if the patient still requires fluid after the plasma chlorides have been restored to normal, it must be given in the form of 5% glucose in water; hypertonic saline is unsatisfactory and dangerous for a patient in this state.

In paralytic ileus, he said, conservative measures for the treatment of obstruction are chiefly applicable, but the surgeon must be certain he is not missing a strangulation. It is better to prevent paralytic ileus than to

cure it, and since the type of case in which it was likely to occur can be recognised, preventive measures can be taken. Injections of liquid pituitary extract, 1 c.cm. four hourly, should be begun immediately after operation and continued for 48 hours; but pituitary extract has no place in the treatment of established ileus. Morphine must be given often enough to ensure that the patient is completely at rest and free from discomfort. Continuous gastroduodenal suction should be used, he considers, to maintain decompression of the bowel, especially if the continuity of the bowel has been interrupted; in the treatment of established ileus suction is maintained until the aspirated material is no longer dark and foul-smelling and the patient's bowels move spontaneously; fluid and salt therapy are maintained throughout. Conservative treatment of strangulation obstruction is never justified but may be useful in mechanical obstruction due to matting shortly after an abdominal operation. Continuous suction and administration of fluid and salt may be followed by recovery, but even if it is not, operation can be carried out later when the bowel is at least partially decompressed and the patient's water and salt balance are normal. If abdominal tenderness develops during conservative treatment, operation is called for; in strangulation obstruction operation must be early but preoperative preparation—stomach washouts and rapid infusion of blood and saline—must not be neglected. If the bowel is viable, simple relief of the strangulation followed by continuous suction and the administration of adequate quantities of fluid are sufficient treatment; but if the bowel is gangrenous he advocates a two-stage operation; the affected loop is brought outside, the peritoneal cavity is closed, the gangrenous portion of gut is removed and the contents from the upper loop are collected and fed into the lower loop. Continuity of the bowel was restored at a second operation, preferably about a week later.

Medical News

University of Cambridge

Dr. W. J. O'Connor has been appointed university demonstrator in pharmacology.

Royal Society of Medicine

A general meeting of the fellows of this society will be held on Tuesday, March 3, at 4.30 P.M. On March 4, at 2.30 P.M., Mr. L. F. Newman will read a paper to the section of the history of medicine on dietetics in the sixteenth and seventeenth centuries. The section of surgery will meet at the same hour to discuss growth and new growth. The opening speakers will be Mr. L. R. Broster, Mr. Harold Burrows, Dr. W. E. Gye, F.R.S., Mr. P. B. Medawar, and Dr. F. G. Spear. At the section of otology, on March 6, at 10.30 A.M., Mr. W. M. Mollison will speak on deafness due to central lag, and Dr. F. W. Kobrak on the functional activity of the tympanic muscles. At 2.30 P.M., on the same day, at the section of laryngology, Mr. V. E. Negus, Mr. T. Pomfret Kilner and Major H. M. Graham will open a discussion on injuries of the nose and throat. The section of anæsthetics meets at the same time, and Mr. Ralph Lee, Mr. H. A. E. Talley and Dr. C. Langton Hewer are reading short papers.

Ophthalmological Society of the United Kingdom

This society proposes to hold a two-day congress in London, on Friday and Saturday, May 29 and 30. Titles of papers should be sent to the acting hon. secretary, Mr. Frank Law, 36, Devonshire Place, London, W.1, before the end of March.

Tuberculosis in Scotland

The annual report of the Royal Victoria Hospital Tuberculosis Trust shows that during this war there has been a greater relative increase in the death-rate from tuberculosis in Scotland than in the first complete year of the last war. In 1914 the death-rate was 162 per 100,000, in 1915 164; in 1939 it was 68, in 1940 80. When the death-rate rises, the cause may be found partly in acceleration of death in old-standing cases, and partly in deaths of those who have recently acquired the disease. Some of the deaths are probably of patients who in peace-time might have survived for several years but who in war-time—owing to overstrain and other factors—succumb more rapidly. When war began large numbers of open cases were sent home to provide accommodation for expected casualties. Infection was passed to children, and the new cases of childhood tuberculosis increased. The committee of the trust consider that these new cases and the old ones whose condition has deteriorated owing to lack of hospital accommodation should be regarded as casualties of war. Facilities for treating such patients are inadequate and the committee urges all responsible authorities to resist any slackening of curative effort. War-time rationing, increased calls of industry, lack of ventilation in blackout hours, and the increased number of cases under domiciliary treatment are all factors helping to spread the disease.

Medical Honours

The M.B.E. has been awarded to Dr. Adaline Miller, for her services as ship's surgeon when the ss. *Britannia* was sunk by enemy gunfire. During the action Dr. Miller attended to the wounded and dying. She continued her good work after the company had taken to the lifeboats and by her efforts saved many lives.

The R.N.V.R. officers' decoration has been awarded to Surgeon Commander B. W. C. Archer, M.D. St. And., Surgeon Commander A. S. Bradlaw, M.B. Dubl., Surgeon Commander F. A. McLaughlin, F.R.C.S., and Acting Surgeon Commander H. M. Willoughby, M.R.C.S.

Conference on Physical Education

On Friday and Saturday, March 6 and 7, at BMA House, Tavistock Square, London, W.C.1, the Ling Association is holding an inter-allied conference on physical education which will be open to teachers of physical education, doctors and others interested. The speakers will include Miss Achsa Bean, M.D., assistant chair- man of the department of health and hygiene of Vassar College; Dr. George Hoan Hsing Woo; Miss Phyllis Spafford, secretary of the association; Lieutenant Kjeld Birkelund, gymnastic instructor in the Norwegian Army; and Mr. Ruscoe Clarke, F.R.C.S. Further information may be had from the offices of the association, Hamilton House, Bidborough Street, London, W.C.1.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

Appointments

JONES, W. D. LOVELOCK, M.B. WALES, D.P.H.: medical superintendent at Amersham Hospital.
MILLER, ADALINE N., M.B. GLASG.: anæsthetist at the Leicester Royal Infirmary.
NUSSBAUM, OLGA, M.D. VIENNA: asst. school M.O. for Wolverhampton.

Births, Marriages and Deaths

BIRTHS

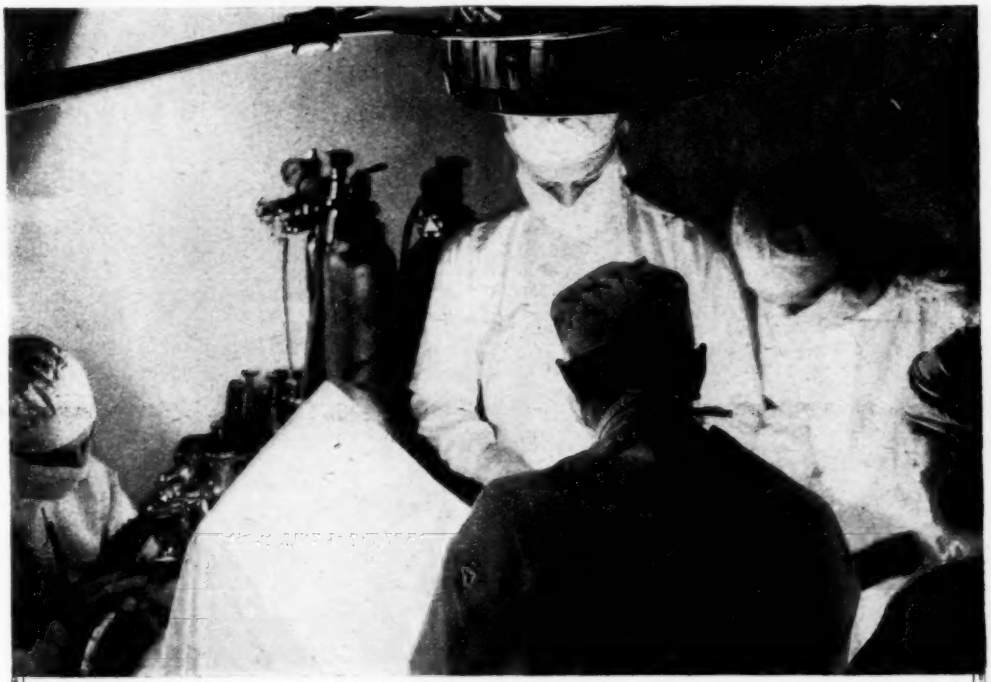
ADDISON.—On Feb. 12, the wife of Major G. M. Addison, R.A.M.C., M.E.F.—a daughter.
HARGREAVES—On Feb. 18, in Weymouth, the wife of Major E. R. Hargreaves, R.A.M.C.—a daughter.
MCKENZIE.—On Feb. 21, at Cheltenham, the wife of Squadron-Leader William McKenzie, F.R.C.S.—a son.
MCKEON.—On Feb. 19, at Lancaster, the wife of Dr. J. A. McKeon—a daughter.
RITCHIE.—On Feb. 18, at Hove, the wife of Dr. Peter Ritchie—a daughter.
WARRACK.—On Feb. 19, in Edinburgh, the wife of Major G. M. Warrack, R.A.M.C.—a son.

MARRIAGES

KENNEDY—NORRIS.—On Feb. 17, in London, Alastair Baird Kennedy, L.M.S.S.A., surgeon lieutenant, R.N.V.R., to Gillian Barbara Norris.
MACLAREN—MUNRO.—On Feb. 19, at Pinchbeck, Henry Colin Maclaren, M.B., to Jean Ramsay Munro.
WALLEY—CAMPBELL.—On Feb. 8, at Stirling, Jon Walley, B.M., surgeon lieutenant, R.N.V.R., to Josephine Helen Campbell, M.R.C.S., captain, R.A.M.C.

DEATHS

BROWN.—On Feb. 21, in Glasgow, James Pearson Brown, D.S.O., T.D., J.P., M.B. GLASG., F.R.F.P.S., of Campbeltown.
CONDER.—On Feb. 15, at Cheltenham, Archibald Francis Reignier Conder, M.C., M.D. EDIN., aged 62 years.
KENDALL.—On Feb. 16, at St. Albans, George William Kendall, M.D. DUBL., of Lordship Park, N.16, and Llynon, Anglesey.
LEWIS SMITH.—On Feb. 18, Frank Lewis Smith, O.B.E., M.R.C.S., surgeon rear-admiral, R.N.
MAY.—On Feb. 20, Walter John May, M.R.C.S., L.D.S., of Upper Wimpole Street, and Gerrard's Cross.
NELSON.—On Feb. 18, at Camberley, Surrey, Kenneth Montague Nelson, M.C., M.R.C.S., lieut.-colonel, R.A.M.C.
O'CARROLL.—On Feb. 18, at Dundrum, co. Dublin, Joseph Francis O'Carroll, M.D. R.U.I., F.R.C.P.I., formerly professor of medicine at University College, Dublin.
ROLL.—On Feb. 21, at Thames Ditton, Grahame Winfield Roll, M.B. CAMB., F.R.C.S., M.R.C.P., aged 79 years.



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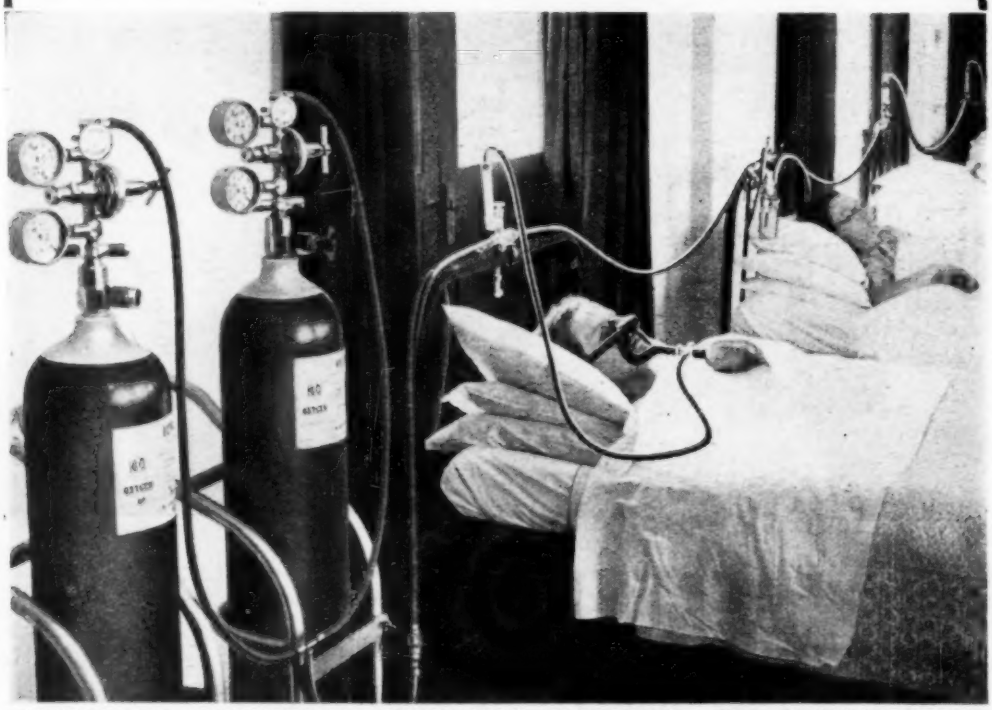

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By ELIOT SLATER, M.B., M.R.C.P., D.P.M.

Six Lectures on PHYSICAL TREATMENT OF MENTAL DISORDERS.
By WILLIAM SARGANT, M.B., M.R.C.P.

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By A. A. W. PETRIE, M.D., F.R.C.P.

The fee for the above course is £3 3s., which is payable at the time of enrolment.

Further series of lectures and demonstrations suitable for Part II of the D.P.M. examination will be arranged to take place in April and May

L. M. S. S. A.

FINAL EXAMINATION: SURGERY, March 9th, April 13th, May 11th, 1942; MEDICINE, March 16th, April 20th, May 18th, 1942; MIDWIFERY, March 17th, April 21st, May 19th, 1942.

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The course will commence on the 16TH MARCH, 1942, at 2.30 P.M., and be held every afternoon during the week. On Friday there will be an additional session from 10 A.M. to NOON, and the last session will commence at 10 A.M. on Saturday, 21st March.

The course is strictly limited to 20 students and is intended for officers. Applications for admission should be made to the DEAN, British Postgraduate Medical School, Ducane-road, W.12.

The fee for the course will be 5 guineas, but no fee will be charged in the case of officers of the Armed Forces who are nominated for the course by their respective Director-Generals.

Royal College of Surgeons of England.

LIBRARY.

The Library will be open on and after MONDAY, 2ND MARCH, 1942, at the following times:—

Monday–Friday: 10 A.M.–1 P.M. and 2–4 P.M.

Saturday: 10 A.M.–1 P.M.

It will be available for the use of Fellows and Members of the College, duly qualified Medical Men and Women, and bona-fide Medical Students.

Increased provision has been made for the needs of Medical Students, and many new textbooks have been given to the Library for their use. Special regulations regarding the use of the Library by Students will be posted in the College.

The greater part of the Library has been evacuated from London, but the following are still in the College: Periodicals for 1940 and 1941, textbooks and monographs from 1914, and books of reference.

KENNEDY CASSELS, Secretary.

28th February, 1942.

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Training under medical supervision. Schools, Farm, Trade Workshops, Recreations. Fees £110 to £375 p.a. Election by votes of subscribers at reduced terms for necessitous trainable cases.

Apply, Secretary. Tel.: Redhill 344.

THE GROVE HOUSE,
CHURCH STRETTON, SHROPSHIRE.

Private Home for Ladies mentally ill. Voluntary and Temporary Patients received.

Medical Superintendent: Dr. J. A. MCCLINTOCK.

SPRINGFIELD HOUSE

Phone: BEDFORD 3417. **Near BEDFORD**

For Mental Cases with or without Certificates.

Ordinary Terms: Five Guineas per week (including Separate Bedrooms for all suitable cases without extra charge).

For forms of admission, &c., apply to the Resident Physician, CEDRIC W. BOWER.

INTERVIEWS IN LONDON BY APPOINTMENT

THE LAW NURSING HOME
ROCHDALE (Lancs)

A Private Hospital, exclusively for the treatment of POST-ENCEPHALITIC PARKINSONISM, PARKINSON'S DISEASE and ALLIED DISORDERS

Founder: The late SIR A. J. LAW, J.P., M.P.

The Nursing Home is governed by Trustees; any surplus is utilized to help patients who cannot afford full fees. Extensive grounds. Hydro. Expert Massage and Physical re-education. Dietary treatment. Equipped with every laboratory apparatus for the investigation and treatment of the diseases. Results of the BULGARIAN TREATMENT published (*Lancet*, 1939, I, 693) approx.: 300 patients treated in the last 3 years. Terms moderate. Further particulars apply Medical Superintendent. Tel. Rochdale 2960.

THE CASSEL HOSPITAL
FOR FUNCTIONAL NERVOUS DISORDERS

new address: ASH HALL, BUCKNALL, near STOKE-on-TRENT, STAFFS

Telephone: ASH BANK 215

Temporarily removed from Swaylands, Penshurst, Kent, to above country house about five miles from Stoke in the direction of Ashbourne.

The Hospital will continue to admit for treatment patients of moderate means suffering from psychoneurotic illnesses.

Patients suffering from psychotic illnesses are not eligible for admission.

Further particulars may be obtained by application to the Medical Director at the new address.

THE COTSWOLD SANATORIUM

On the Cotswold Hills seven miles from Cheltenham, Stroud and Gloucester. Fully equipped for the treatment of all forms of Tuberculosis. **Terms: 5½ to 9½ guineas per week, inclusive.** Full particulars from MEDICAL SUPERINTENDENT, Cotswold Sanatorium, Cranham, Gloucester. *Telephone:* Witcombe 81. *Telegrams:* "Hoffman, Birdlip."

HAYDOCK LODGE,
NEWTON-LE-WILLOWS, LANCASHIRE.

For the reception and treatment of PRIVATE PATIENTS of both sexes of the UPPER AND MIDDLE CLASSES suffering from Mental and Nervous Disorders, Alcoholism and Drug Addiction, either voluntarily, temporarily, or under certificate. Patients are classified in separate buildings according to their mental condition. Situated in park and grounds of 400 acres. Self-supported by its own farm and gardens in which patients are encouraged to occupy themselves. Every facility for indoor and outdoor recreation. For terms, prospectus, etc., apply MEDICAL SUPERINTENDENT. *Telephone:* Ashton-in-Makerfield 7311. *Telegraphic Address:* Wootton, Ashton-in-Makerfield.

VALE OF CLWYD SANATORIUM

This Sanatorium is established for the treatment of Tuberculosis of the Lungs and the Pleural Cavities. It is situated in the midst of a large area of park-land at a height of 450 feet above sea-level. Average rainfall 29·57 per annum. Full day and night Nursing Staffs. X-ray plant. Every facility for Artificial Pneumothorax and for operations on the Chest. Electric Lighting. Central Heating.

For particulars apply to Medical Superintendent.

H. MORRISTON DAVIES, M.D., M.Ch. (Cantab.), F.R.C.S., Llanbedr Hall Ruthin, N. Wales.

Telephone: WELbeck 2728 Telegrams: "ASSISTIAMO, LONDON"
For MEDICAL, SURGICAL, and
MENTAL NURSES
Male or Female
THE NURSES' ASSOCIATION
In conjunction with the MALE NURSES' ASSN.
29, YORK ST., BAKER ST., LONDON, W.1
Mrs. MILLICENT HICKS, *Superintendent* W. J. HICKS, *Secretary*

THE MAGHULL HOMES FOR EPILEPTICS (Inc.)
MAGHULL (near LIVERPOOL)
FARMING and OPEN AIR OCCUPATION for PATIENTS
A few vacancies in 1st and 2nd Class Houses.
FEES: 1st Class (men only) from £3 per week upwards.
2nd Class (men and women) 32/- per week.
For further particulars apply C. EDGAR GRISEWOOD, A.C.A.
Secretary, 20, Exchange Street East, Liverpool, 2

MALLING PLACE, KENT
For LADIES and GENTLEMEN of Unsound Mind.
Terms moderate. Apply to Resident Medical Superintendent.
Telegrams: ADAM WEST MALLING. Telephone No. 2: MALLING.

CHEADLE ROYAL CHEADLE CHESHIRE
A Registered Hospital for MENTAL DISEASES, and its Seaside Branch, GLAN-Y-DON, Colwyn Bay, N. Wales
The object of this Hospital is to provide the most efficient means for the treatment and care of those of the Upper and Middle Classes suffering from MENTAL and NERVOUS DISEASES. The Hospital is governed by a Committee appointed by the Trustees of the Manchester Royal Infirmary. VOLUNTARY, TEMPORARY, AND CERTIFIED PATIENTS RECEIVED
For Terms and further information apply to the MEDICAL SUPERINTENDENT *Telephone*: GATLEY 2231

COURT HALL, KENTON, near EXETER
FOR THE TREATMENT OF EIGHT LADIES, VOLUNTARY, TEMPORARY AND CERTIFIED PATIENTS
CLIFFDEN, TEIGNMOUTH
FOR EARLY AND CONVALESCENT CASES Recreational Therapies are held daily by skilled Leaders
The house stands high with spacious balconies and extensive views of the South Devon Coast. Beautiful garden. Own Dairy in 25 acres. Private road to beach
There is also a charming house, EBWORTHY, MANATON, DARTMOOR, situated in 20 acres, 1100 ft. up for bracing moorland air
Resident Physicians—BERTHA M. MULES, M.D., B.S. ANNE S. MULES, M.R.C.S., L.R.C.P. *Telephones*—STARCROSS 259 and TEIGNMOUTH 289

SHAFTESBURY HOUSE FORMBY-BY-THE-SEA Nr. LIVERPOOL
Specially built and licensed for the care and treatment of a limited number of Ladies and Gentlemen suffering from NERVOUS and MENTAL breakdown. Voluntary and certified patients received. Ladies also admitted as Temporary Patients without certification. Terms moderate. *Apply*, RESIDENT PHYSICIAN, who may be seen in Liverpool, by appointment. *Tel. No.* 8 *Formby.*

THE OLD MANOR, SALISBURY Telephone: 3216 & 3217
A Private Hospital for the Care and Treatment of those of both sexes suffering from MENTAL DISORDERS
Extensive grounds. Detached Villas. Chapel. Garden Produce from own gardens. Terms very moderate.
CONVALESCENT HOME AT BOURNEMOUTH
standing in 12 acres of ornamental grounds, with separate villas, tennis courts, etc. Patients or Boarders may visit the Home by arrangement.
Illustrated Brochure on application to the Medical Superintendent, The Old Manor, Salisbury.

PECKHAM HOUSE, 112, Peckham Road, London, S.E.15
Telegrams: "Alleviated, London" Telephone: Rodney 2641-2642
A Private Mental Hospital, for Ladies and Gentlemen suffering from Nervous and Mental Illness, where the amenities of a comfortable home are combined with full investigation and every well-established modern treatment.
Terms from 3½ guineas weekly.
Illustrated Prospectus may be obtained from the Physician Superintendent.

RUTHIN CASTLE, NORTH WALES
A Private Clinic, the first in Great Britain, for investigation and treatment of all forms of disease, except infectious and mental
There is a steel and concrete Air Raid Shelter with heating and a lift to all floors
Inclusive charges Apply SECRETARY Telephone: Ruthin 88

CAMBERWELL HOUSE, 33, Peckham Road, London, S.E.5
Telegrams: "PSYCHOSIS, LONDON" FOR THE TREATMENT OF MENTAL DISORDERS *Telephone:* RODNEY 4243 (2 lines)
Completely detached Villas for mild cases. Voluntary Patients received. Twenty acres of grounds; own garden produce. Hard and grass tennis courts, putting greens, Recreation Hall with Badminton Court, and all indoor amusements. Occupational therapy, Calisthenics, Actino-therapy, prolonged immersion baths, shock and also modified insulin treatment. Chapel.
Senior Physician, Dr. HUBERT JAMES NORMAN, assisted by a resident Medical Staff and visiting Consultants
An Illustrated Prospectus giving fees, which are strictly moderate, may be obtained upon application to the Secretary
The Convalescent Branch is HOVE VILLA, BRIGHTON, and is 200 ft. above sea-level

CRICHTON ROYAL, DUMFRIES FOR NERVOUS AND MENTAL DISORDERS
Cases of Alcoholism and Drug Addiction are admitted. Every facility for individual treatment on the most modern lines. Special Department for Insulin Therapy. Fully equipped Gymnasium, Golf Course, and Indoor Swimming Pool. Specially trained Occupational and Recreational Therapists.
Medical Certificates given anywhere in the British Isles are valid for admission of patients.
Physician Superintendent: P. K. McCOWAN, J.P., M.D., F.R.C.P., D.P.M., Barrister-at-Law. *Telephone*: Dumfries 1119.

THE RETREAT, YORK

The Pioneer Hospital, opened 1796, for the humane treatment of those suffering from Nervous and Mental Disorder

This Hospital of 200 beds, administered by a Committee of the Society of Friends, combines what is best in the investigation and treatment of nervous illness with a sympathetic and friendly atmosphere. Last year 156 patients were admitted, of whom 132 were voluntary cases.

Much curative work is accomplished in our mental hospitals to-day and the recovery rate compares very favourably with that of our general hospitals.

For information and terms of admission apply to:—
The Physician Superintendent,
ARTHUR POOL, M.R.C.P.
(Telephone: York 3612)
who is available for consultation

CALDECOTE HALL
NUNEATON
WARWICKSHIRE
('Phone: Nuneaton 241)

Residential treatment of
"Nervous Disorders" & Alcoholism
(Certifiable cases are not received)

This beautiful mansion situated in the heart of the country (less than two hours from London by L.M.S.R.) and surrounded by charming pleasure grounds in which games and outdoor occupational therapy are available is devoted to the treatment of Alcoholism and "Nerves" by psychotherapeutic and ancillary methods.

Illustrated Brochure and particulars obtainable from A. E. CARVER, M.D., D.P.M., Resident Medical Superintendent.

FENSTANTON at "FIVE DIAMONDS," Chalfont St. Giles, Bucks

A Private Home for the Care and Treatment of a limited number of LADIES with Mental and Nervous Disorders. Certified, Voluntary, and Temporary Patients received. Mansion with 12 acres of ground. (See *Medical Directory*, p. 2362.) Apply Resident Physician. Telephone: Little Chalfont 2046. Station: Chalfont and Latimer.

CITY OF LONDON MENTAL HOSPITAL
Near DARTFORD, KENT.

Ladies and Gentlemen received for treatment under certificates, and without certificates as either VOLUNTARY or TEMPORARY PATIENTS, at a weekly fee of £2 9s., and upwards.

THE COPPICE, NOTTINGHAM
HOSPITAL FOR MENTAL DISEASES
President: The Right Hon. LORD BELPER

REGISTERED HOSPITAL for Voluntary, Temporary, or Certified PRIVATE PATIENTS of UPPER and MIDDLE CLASSES. Own kitchen garden. Modern forms of treatment, including Electro-shock Therapy. Out-door games, cinema visits, motor drives arranged. Visiting Chaplain.

For terms, &c., apply to: Dr. G. M. WODDIS, Medical Superintendent. Telephone: 64117 Nottingham.

CHISWICK HOUSE,
PINNER, MIDDLESEX.
Telephone: PINNER 234.

A Private Hospital for the Treatment and Care of Mental and Nervous Illnesses in both Sexes.

A modern country house, 12 miles from Marble Arch, in attractive and secluded surroundings. Fees from 10 guineas per week inclusive. Cases under Certificate, Voluntary and Temporary Patients received for treatment.

DOUGLAS MACAULAY, M.D., D.P.M.

The Royal Cancer Hospital (Free)
(Incorporated under Royal Charter),
Fulham-road, London, S.W.3.

Applications are invited from registered medical practitioners for the appointment of RESIDENT MEDICAL OFFICER (B1), to commence duties on 1st April, 1942. Applicants should have held house appointments and had surgical experience. The appointment is for twelve months at a salary at the rate of £350 per annum, with board, residence, and laundry. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply.

Applications, to be made on a form which will be supplied by the Secretary, with copies of not more than three recent testimonials, to be sent to the Secretary not later than the first post on Wednesday 11th March, 1942.

CLEMENT COBBOLD, Secretary.

The Royal Cancer Hospital (Free)
(Incorporated under Royal Charter),
Fulham-road, London, S.W.3.

The Committee are prepared to receive applications for the post of DIRECTOR OF THE PATHOLOGICAL DEPARTMENT. Experience in Tumour Pathology essential. Salary £1000 per annum. The appointment is a temporary one and terminable within twelve months of the conclusion of hostilities. The appointment is subject to rules, a copy of which can be obtained from the Secretary.

Applications, accompanied by copies of not more than three recent testimonials, to be sent to the Secretary not later than Monday, 9th March, 1942. CLEMENT COBBOLD, Secretary.

Examining Surgeons:
FACTORIES ACT, 1937.

The following appointment as Examining Surgeon under the Factories Act, 1937, is vacant.

Applications should be sent to the CHIEF INSPECTOR OF FACTORIES, 28, Broadway, London, S.W.1.

District	*County*	*Latest date for receipt of application*
TONGUE ..	SUTHERLAND ..	10th March, 1942.

Resident Junior Assistant Medical
OFFICER (B2) required by MIDDLESEX COUNTY COUNCIL for NORTH MIDDLESEX COUNTY HOSPITAL, Edmonton, N.18. Applications invited from registered medical practitioners, Men or Women, who have held resident appointments in general hospitals, and also from R practitioners who now hold A posts. Salary £250 per annum, plus cost-of-living bonus. Board, lodging, and laundry. Whole-time general medical and surgical duties such as Council may direct under supervision of Medical Superintendent. Appointment, subject to medical examination and one month's notice, is for six months with possibility of extension to twelve months (except in case of R practitioners). Post vacant 22nd March, 1942.

Application, stating age, qualifications with dates, nationality, present post, and previous appointments, to the undersigned. No application forms provided. Relationship to any member or officer of the Council to be disclosed. Copies of not more than three recent testimonials. Canvassing, directly or indirectly, will disqualify. Closing date 7th March, 1942.

C. W. RADCLIFFE, "B3," Clerk of the County Council.
Guildhall, Westminster, S.W.1.

Middlesex County Council.

ASSISTANT MEDICAL OFFICER (Temporary) required in Public Health and School Medical Department. Qualified registered medical practitioners, with special experience in antenatal work. Public Health degree or diploma desirable. Whole-time duties under County Medical Officer include medical inspection of school-children, supervision of treatment of minor ailments, carrying out work under maternity and child welfare schemes, &c. Salary £600 per annum, with out-of-pocket travelling expenses. Subject to medical examination and one month's notice. Must reside in such district as required.

Written applications, giving age, qualifications, and experience, with copies of not more than three recent testimonials, to the undersigned by 14th March, 1942. Canvassing, directly or indirectly, disqualifies. Application forms not provided.

C. W. RADCLIFFE, "B3," Clerk of the County Council.
Guildhall, Westminster, S.W.1.

UNIVERSITY EXAMINATION POSTAL INSTITUTION

17, RED LION SQUARE, LONDON, W.C.I

Over 50 years' experience

POSTAL AND ORAL COACHING

FOR

ALL MEDICAL EXAMINATIONS

MEDICAL PROSPECTUS (36 pages),

sent gratis, along with List of Tutors, &c., on application to the Principal, 17, Red Lion-square, London, W.C.I. (Telephone: HOLborn 6313.)

Middlesex County Council.

NON-RESIDENT ASSISTANT MEDICAL OFFICER (B1) required for WEST MIDDLESEX COUNTY HOSPITAL, Isleworth, Middlesex (must live near Hospital). Applicants must be registered medical practitioners (including suitably qualified R practitioners holding B2 or B1 posts) who have held resident appointments in general hospitals and had special experience in obstetrics and gynæcology. Post now vacant. Salary £400 by £25 to £475 per annum, plus a non-resident cash allowance of £100 per annum. Whole-time duties such as Council may direct under supervision of Medical Superintendent. Appointment is for four years only, subject to medical examination and one month's notice.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, to the undermentioned. Application forms not provided. Relationship to any member or officer of the Council to be disclosed. Copies of not more than three recent testimonials. Canvassing, directly or indirectly, will disqualify. Closing date 7th March, 1942.

C. W. RADCLIFFE, "B3," Clerk of the County Council.
Guildhall, Westminster, S.W.1.

Hospital for Consumption and Diseases

OF THE CHEST, Brompton, S.W.3.

Applications are invited for the following appointments from registered medical practitioners, Male and Female, including R practitioners who now hold A posts:—

HOUSE PHYSICIANS (B2), for which there are two vacancies. The duties include work in the Out-patient Department as well as in the wards, and the appointment is for six months, commencing on 1st May, with an honorarium of £50

HOUSE PHYSICIAN (B2) at the SANATORIUM at FRIMLEY The appointment is for six months, commencing on 1st May with an honorarium of £50.

Applications, stating age, qualifications with dates, nationality and present post, and accompanied by copies of one or more recent testimonials, should reach the undersigned not later than Saturday, 7th March, 1942.

Brompton, February, 1942. F. G. ROUVRAY, Secretary.

St. Mary's Hospital, London, W.2.

THIRD ASSISTANT PATHOLOGIST (B1).

Applications are invited for the above post. The appointment is for a period of twelve months (the holder to be eligible for re-election for a second period of twelve months) as from a date to be arranged, at a salary of £350 per annum (for the period of the war). Suitably qualified R practitioners holding B2 or B1 appointments may apply.

Applications, stating nationality, date of birth, permanent address, qualifications, and appointments held, together with copies of not more than three testimonials, must reach the undersigned on or before Wednesday, 4th March, 1942.

E. W. STOCKWELL, Secretary.

Wembley Hospital.

(118 Beds.)

Applications are invited from registered medical practitioners (Male or Female) for the appointment of RESIDENT SURGICAL OFFICER at a salary of £450 per annum, together with board, residence, and laundry. To commence duties as soon as possible after 8th March. Applicants will be expected to do emergency surgery and therefore should have had the necessary experience. The post will probably include E.M.S. surgery.

Applications, stating age, qualifications, and any testimonials available, should be sent not later than Saturday, 7th March, to: GEORGE A. PAINES, F.C.I.S., House Governor.

The Nelson Hospital, Merton, S.W.20.

Applications are invited from registered medical practitioners for the appointment of Two RESIDENT HOUSE SURGEONS (A) (Male), to become vacant on 1st and 15th April, 1942, respectively. R practitioners within three months of qualification may apply when appointment will be for a period of six months; otherwise it will be for six months in the first instance. Salary at rate of £200 per annum, resident.

Applications, with copies of recent testimonials, should be sent to the SECRETARY forthwith.

Poplar Hospital,

East India Dock-road, E.14.

Applications are invited from registered medical practitioners, Male or Female, for the appointment of HOUSE SURGEON (A). R practitioners within three months of qualification may apply, when appointment will be for a period of six or nine months.

Applications are also invited from registered medical practitioners, Male or Female, for the appointment of HOUSE SURGEON (B2). R practitioners who now hold A posts may apply, when appointment will be limited to six months. Otherwise it will be for a period of nine months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent as soon as possible.

D. H. LINDSAY, House Governor and Secretary.

West London Hospital,

Hammersmith, W.6.

APPOINTMENT OF RESIDENT ANÆSTHETIST AND E.N.T. AND OPHTHALMIC HOUSE SURGEON (B2).

Applications are invited from registered medical practitioners for the above appointment, to become vacant on 25th March, including R practitioners now holding A posts who have not completed six months in such post.

The appointment is for a period of six months and is terminable by one month's notice on either side. Salary according to experience, but not less than £100 per annum, with the usual residential emoluments.

Applications, stating age, qualifications with dates, nationality, and present post, should be accompanied by copies of three recent testimonials, and should reach the undersigned not later than Wednesday, 11th March. H. A. MADGE, Secretary.

City and County of Bristol.

DEPARTMENT OF PUBLIC HEALTH.

SOUTHMEAD MUNICIPAL GENERAL HOSPITAL.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of JUNIOR ASSISTANT RESIDENT MEDICAL OFFICERS (A), to become vacant on the 1st March. R practitioners within three months of qualification may apply when appointment will be for a period of six months. Salary is at the rate of £200 per annum, with full residential emoluments and war bonus.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent forthwith to: R. H. PARRY, Medical Officer of Health.

Department of Public Health, Kenwith Lodge, Westbury Park, Bristol, 6, 21st February, 1942.

County Borough of Oldham.

WESTHULME HOSPITAL FOR INFECTIOUS DISEASES.

Applications are invited from unmarried registered medical practitioners for the appointment of RESIDENT MEDICAL OFFICER (B1).

Applicants should have had previous hospital experience, and suitably qualified R practitioners holding B2 or B1 posts may apply. The appointment is in the first instance for a period of six months and renewable subject to satisfactory service. The salary is at the rate of £300 per annum and war bonus as approved by the Council, together with board, residence, and laundry, which are valued at £150 per annum. If the appointment is continued beyond twelve months, the salary will be at the rate of £350 per annum, rising by annual increments of £25 to £450 per annum, together with emoluments as above. The successful candidate will be required to pass a medical examination and to contribute to the appropriate superannuation fund.

Forms of application and conditions of service should be obtained from the Medical Officer of Health, Town Hall, Oldham, and must be returned to him marked "Resident Medical Officer," together with copies of three recent testimonials, not later than 20th March, 1942.

THOMAS ALKER, Town Clerk.

Town Hall, Oldham, 20th February, 1942.

Kettering and District General

HOSPITAL.

Applications are invited from registered medical practitioners for the appointment of a HOUSE SURGEON (A), including R practitioners within three months of qualification, when appointment will be for a period of six months. Salary is at the rate of £200 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to the undersigned as soon as possible.

G. W. JACKSON, Secretary-Superintendent.

Maidenhead Voluntary Hospital.

RESIDENT MEDICAL OFFICER (B2) required for the above Hospital. R practitioners holding A posts may apply. Appointment is for six months, commencing 15th March. Salary approved by the Emergency Medical Service at the rate of £200 per annum.

Applications, stating age, nationality, and copies of three recent testimonials, should be sent to—

R. GODFREY, Superintendent-Secretary.

HIS MAJESTY'S COLONIAL SERVICE

THE COLONIAL MEDICAL SERVICE

VACANCIES FOR MEDICAL OFFICERS

The maintenance of an efficient Colonial Medical Service constitutes a vital part of the national war effort and it is most important that the Service should be assured of an adequate supply of doctors.

The Secretary of State for the Colonies therefore invites applications from doctors possessing a medical qualification registrable in the United Kingdom who are British subjects and who are under thirty-five years of age.

Medical Officers are appointed in the first instance for general service. But there are ample opportunities for work in special branches of medicine and surgery, in public health and in medical research.

The normal salary scale is from £630 to between £1,000 and £1,120. There are large numbers of super-scale posts to which promotion is made on merit and which carry higher salaries.

Government quarters, in many cases free of rent, and first-class passages to and from the Colonies are provided, and an adequate pension scheme is in force.

Selected candidates are normally required to attend a course of instruction in Tropical Medicine and Hygiene either before proceeding overseas or during their first period of leave.

Further particulars, including the regulations governing admission to the Colonial Medical Service, may be obtained from the Director of Recruitment (Colonial Service), 2, Park-street, London, W.1.

Sir John Priestman,

DURHAM COUNTY AND SUNDERLAND EYE INFIRMARY.

Applications are invited for a RESIDENT HOUSE SURGEON (B2) (Male or Female). R practitioners holding A posts may apply when appointment will be limited to six months. The Infirmary is recognised by the Royal College of Surgeons as partial course of D.O.M.S. (60 Beds.) Salary commencing at £175 per annum, with board, residence, and laundry, rising to £200 per annum after the period of one year.

Applications, stating age and experience, together with copies of two recent testimonials, to be delivered to the SECRETARY, The Sir John Priestman, Durham County and Sunderland Eye Infirmary, Alexandra-road, Sunderland, not later than 15th March.

Chesterfield and North Derbyshire

ROYAL HOSPITAL.
(460 Medical and Surgical (normal and M.S.) Beds.)

Applications are invited from registered medical practitioners (Male and Female) for the appointment of a HOUSE SURGEON (A), to commence immediately, for a period of six months. Salary £150 per annum, with full residential emoluments. The successful applicant will be required to reside in and also carry out duty at the Hospital Annexe (80 Beds). R practitioners within three months of qualification may apply.

Applications, stating nationality, age, and qualifications with dates, together with copies of three recent testimonials, should be sent as soon as possible to—

M. H. BOONE, House Governor and Secretary.

16th February, 1942.

Doncaster Royal Infirmary.

Applications are invited from registered medical practitioners, including R practitioners within three months of qualification, for the following appointments: (1) CASUALTY HOUSE SURGEON (A) (Male), and (2) HOUSE SURGEON (A) (Male). Required immediately. The appointments are for six months. Salary at the rate of £175 per annum, with residence, board, and laundry. This large industrial area offers excellent opportunity for gaining experience.

Applications, accompanied by not more than three testimonials, to be sent immediately to—

R. LANCASTER, Secretary-Superintendent.

Hull Corporation Health Department.

BEVERLEY ROAD HOSPITAL.

TEMPORARY ASSISTANT MEDICAL OFFICER (A).

Applications are invited from registered medical practitioners of either sex, who must be single and not more than forty years of age, for the above residential appointment. R practitioners within three months of qualification may apply when appointment will be for a period of six months; otherwise it will be for a period of one year. Salary £250 per annum, together with usual residential emoluments.

Application forms may be obtained from the MEDICAL OFFICER OF HEALTH, Guildhall, Hull, to whom they should be returned immediately.

Royal Lancaster Infirmary,

LANCASTER. (267 Beds.)
(Five Resident Officers. Hospital recognised by the Royal College of Surgeons (England) for Two Senior Posts.)

JUNIOR HOUSE SURGEON (A) (general duties), also HOUSE PHYSICIAN (A), required immediately. Salaries £130 per annum, with board, residence, and laundry. R practitioners within three months of qualification may apply. Appointment is for six months.

Applications, stating age, qualifications, experience, and nationality, together with copies of three recent testimonials, to be sent immediately to—

FRANK A. MILNES, Superintendent-Secretary.

East Lancashire Homes for Disabled

SAILORS AND SOLDIERS, Broughton House, Park-lane, Kersal, MANCHESTER.

RESIDENT MEDICAL SUPERINTENDENT required shortly. Unmarried man or widower. Quarters, board, and laundry provided. Salary £400 per annum. Post would suit retired Service officer or doctor interested in ex-Servicemen. Duties light.

Apply to E. MESSENGER, F.C.A., Secretary, 40, South King-street, Manchester, 2.

Burton-on-Trent General Infirmary.

Applications are invited from registered medical practitioners (Male) for the appointment of CASUALTY OFFICER and HOUSE PHYSICIAN (A), including R practitioners within three months of qualification when appointment will be for six months. Salary at the rate of £150 per annum, with usual emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, to be sent to—

E. W. THORNLEY, Superintendent and Secretary.

West Cornwall Hospital, Penzance.

(Total 186 Beds.)

Applications are invited from registered medical practitioners, Male, for the appointment of HOUSE SURGEON (A). R practitioners within three months of qualification may apply when appointment will be for a period of six months. Salary is at the rate of £150 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to—

K. I. NEWELL, Secretary-Superintendent.

County of Warwick.

Applications are invited for the position of Whole-time RADIOLOGIST to the Warwickshire County Council.

The duties of the office will be primarily concerned with the radiological diagnostic work at the six main hospitals under the control of the Council centred on the Warwick Hospital. The person appointed will be required regularly to visit each of the hospitals concerned and he will not be permitted to undertake private practice.

Applicants must hold the D.M.R.E. or the F.F.R.

The salary of the office will be at the rate of £1000 per annum inclusive, and the person appointed will be required to provide a car. Travelling allowances will be payable in accordance with the Council's "B" scale. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and is subject to three months' notice on either side to determine.

Applications, on forms which may be obtained from the Public Assistance Officer, Shire Hall, Warwick, should be returned to him not later than the 19th March, 1942.

L. EDGAR STEPHENS, Clerk of the Council.

Shire Hall, Warwick, 19th February, 1942.

County Borough of Brighton.

ASSISTANT MEDICAL OFFICER (CIVIL DEFENCE).

Applications are invited for the above appointment from registered medical practitioners (Male) at a salary of £600 per annum, plus motor-car allowance of £50 per annum, unless and until the Corporation shall make available a car for the use of the officer appointed.

Applications must be made on the official form which may be obtained (on receipt of a stamped addressed foolscap envelope) from the undersigned, and should be returned not later than 12 NOON on Monday, 16th March, 1942.

Canvassing, either directly or indirectly, will be a disqualification.

J. G. DREW, Town Clerk.

Town Hall, Brighton, 1, 21st February, 1942.

City of Manchester.

MONSALL HOSPITAL FOR INFECTIOUS DISEASES.
(600 Beds.)

APPOINTMENT OF JUNIOR RESIDENT ASSISTANT MEDICAL OFFICER (A).

Applications are invited from registered medical Men for the above appointment which is vacant now. The appointment will be for a period of six months, renewable for a further six months. R practitioners within three months of qualification may apply when appointment will be for a period of six months. No vacancies exist at the Hospital for an alien medical officer at present.

Preference will be given to candidates who have held resident surgical and medical posts in a general hospital and have taken the Diploma in Public Health or had special experience in bacteriology.

The basic salary for the appointment is at the rate of £250 per annum or, if held by an R practitioner as above, £125 per annum, together with full residential emoluments subject to the Manchester Corporation conditions of service. A temporary cost-of-living wages award is payable in addition to the foregoing salaries.

Full information and forms of application may be obtained from the Medical Officer of Health, Hospitals Administration Section, P.O. Box 399, Town Hall, Manchester, 2, and applications for the post must be received by him not later than 18th March, 1942.

Canvassing in any form is prohibited.

R. H. ADCOCK, Town Clerk.

Town Hall, Manchester, 2, 19th February, 1942.

Ashwood Maternity Home, Woking.

Applications are invited from British registered practitioners for the appointment at Ashwood Maternity Home, Woking, of RESIDENT MEDICAL OFFICER (B2), to commence as soon as possible. The appointment will be for six months. R practitioners holding A posts may apply. Salary at the rate of £200 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and present post, should be sent not later than 7th March, 1942, to—

ROBERT BORLEY, Secretary.

St. Thomas's Hospital, London, S.E.1.

Coventry and Warwickshire Hospital.

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL REGISTRAR (B1), which becomes vacant on the 1st April next. Applicants should have held previous house appointments and have had surgical experience. Preference will be given to candidates holding the diploma of F.R.C.S. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply. Salary will be at the rate of £500 per annum, together with full residential emoluments.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent to the HOUSE GOVERNOR AND SECRETARY, Coventry and Warwickshire Hospital, Coventry.

Surrey County Council.

TEMPORARY ASSISTANT MEDICAL OFFICER, BOTLEYS PARK COLONY, CHERTSEY, SURREY.

Applications are invited from registered medical practitioners who are exempt from military service for the indicated post at the above-mentioned Colony for mental defectives. Salary scale £350—£25–£450 per annum, with full residential emoluments. The commencing salary will be at a point on the scale according to experience and qualifications.

Applications, stating age, qualifications, and previous experience, to be sent to the Medical Superintendent, Botleys Park, Chertsey, Surrey. DUDLEY AUCKLAND, Clerk of the Council.

19th February, 1942.

Scarborough Hospital.
(140 Beds.)

Applications are invited from registered medical practitioners (Female) for the posts of HOUSE SURGEON (A) and HOUSE PHYSICIAN (A). The appointments are for six months beginning 1st May, 1942. Salary at the rate of £150 per annum, together with board, residence, laundry, &c.

Applications, stating age and experience, together with not more than three recent testimonials, to be sent to the HONORARY SECRETARY not later than the first post on Monday, 16th March.

Addenbrooke's Hospital, Cambridge.

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), to become vacant on 26th May, 1942. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding the diploma of F.R.C.S. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply. Salary is at the rate of £350 per annum.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent not later than Wednesday, 22nd April, 1942, to—

J. A. BEARDSALL, Secretary-Superintendent.

City of Liverpool.

ISOLATION HOSPITALS.

Applications are invited from registered medical practitioners entitled to practise in the British Isles (Male and Female), including R practitioners who now hold A posts, for the appointment of RESIDENT ASSISTANT MEDICAL OFFICER (B2) at Liverpool Isolation Hospitals.

The appointment will be limited to six months to R practitioners; otherwise it will be for a period of twelve months. The salary is at the rate of £250 per annum, with full residential allowances. All fees received in connexion with the appointment to be handed over to the City Council. The appointment will be made in accordance with the Standing Orders of the City Council and will be determinable by one month's notice on either side.

Applications, stating whether R practitioner, age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be endorsed "Resident Medical Officer" and sent not later than 10 A.M., Monday, 9th March, 1942, to—

W. H. BAINES, Town Clerk.

Municipal Buildings, Dale-street, Liverpool, 2,
February, 1942.

Salford Royal Hospital.
(256 Beds.)

Applications are invited from Men and Women for the post of BIO-CHEMIST in the PATHOLOGICAL LABORATORY. University degree in Chemistry preferred. Consideration would be given to the application of a skilled chemist who wishes to begin the study of Bio-chemistry. Salary £250 to £300 per annum, according to qualifications and experience. Superannuation scheme in force.

Applications to be sent to the GENERAL SUPERINTENDENT AND SECRETARY.

Salford Royal Hospital.
(256 Beds.)

Applications are invited from registered medical practitioners, Male and Female, including R practitioners within three months of qualification, for the following vacancies: Two HOUSE SURGEONS (both A appointments), which will become vacant on 1st April, 1942. Salary at the rate of £125 per annum, with full residential emoluments. The appointments are normally for six months.

Applications, on the prescribed form, should be sent at once to the undersigned, from whom further particulars and form of application are obtainable.

H. B. SHELSWELL, General Superintendent and Secretary.

21st February, 1942.

Preston and County of Lancaster
ROYAL INFIRMARY.

Applications are invited for the following posts, vacant shortly, from registered medical practitioners:—

CASUALTY HOUSE SURGEON (B2);

HOUSE SURGEON (B2) (under Consulting Surgeon); including R practitioners who now hold A posts.

HOUSE SURGEON (B2) (under Consulting Surgeon); including R practitioners within three months of qualification.

The two House Surgeons' posts are recognised by the Royal College of Surgeons. Appointments for six months. Salaries are at the rate of £175 per annum for the B2 posts and £150 for the A post, with the usual residential allowances.

Applications, stating age, nationality, qualifications with dates, and present post (if any), and accompanied by recent testimonials, to be forwarded to the undersigned as soon as possible. JOHN GIBSON, Superintendent and Secretary.

The Bolton Royal Infirmary.
(242 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), mainly in charge of GYNÆCOLOGICAL and EAR, NOSE, AND THROAT DEPARTMENTS, including R practitioners within three months of qualification. The appointment will become vacant on 18th March, 1942, and is for a period of six months. Salary £150 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent immediately to—

H. AUBREY FROGGATT, Superintendent-Secretary.

East Suffolk and Ipswich Hospital.

The Board of Management invites applications for the appointment on the Visiting Medical Staff of HONORARY OPHTHALMIC SURGEON to fill a vacancy occasioned by death.

Candidates must be medical graduates of one of the universities of the British Empire and their names entered on the Medical Register. The appointment is temporary and is terminable within twelve months of the conclusion of hostilities, but the candidate will be eligible for re-election. Canvassing will disqualify.

Form of application, which should be returned by 21st March, can be obtained from: ARTHUR GRIFFITHS, Secretary.

The Hospital, Ipswich, 28th February, 1942.

Borough of Stockton-on-Tees.

Applications are invited for the permanent position of ASSISTANT MEDICAL OFFICER OF HEALTH (Male or Female) for the Borough of Stockton-on-Tees.

The officer appointed will be required to work under the direction of the Medical Officer of Health and the School Medical Officer.

The salary will be £600 per annum, rising by two half-yearly increments of £50 to a maximum of £700. Candidates must be registered medical practitioners and possess a recognised diploma in Public Health.

The duties will be mainly in connexion with maternity and child welfare, the treatment of infectious disease, civil defence and school medical service, together with such other duties as the Medical Officer of Health may direct.

The person appointed will not be allowed to engage in private practice.

Canvassing, either directly or indirectly, will be regarded as a disqualification. The appointment may be terminated by one calendar month's notice on either side.

Applications, stating present and previous appointments, age, qualifications, and experience, accompanied by not more than two recent testimonials, must be sent, endorsed "Assistant Medical Officer of Health," not later than the 16th March, 1942, to: ERIC BELLINGHAM, Town Clerk.

Barclays Bank Chambers, 49, High-street, Stockton-on-Tees.

Surrey County Council.

Applications are invited from registered medical practitioners (Male) for the post of DEPUTY MEDICAL SUPERINTENDENT in the Surrey County Mental Hospital Service. The appointment is temporary, and will, subject to satisfactory service, continue for the further duration of the war.

Scale of salary £720, rising by annual increments of £25 to a maximum of £820 per annum. In fixing the commencing salary regard will be had to the experience and attainments of the person appointed. A house is available on the Hospital Estate, and there are no other emoluments attached to the post. In the case of a single man, board and lodging may be provided in the Hospital, in which case an appropriate adjustment of the cash salary will be made.

Candidates should preferably hold the Diploma in Psychological Medicine, or equivalent degree.

The appointment is subject to termination by three calendar months' notice on either side, and the person appointed will be required to undergo a medical examination.

Applications, stating age, and whether married or single, accompanied by copies of three recent testimonials, must reach the undersigned not later than Wednesday, the 11th March, 1942. The envelope should be marked "Deputy Medical Superintendent." DUDLEY AUCKLAND, Clerk of the Council.

Mental Hospitals Department, County Hall, Kingston-upon-Thames, 16th February, 1942.

County Borough of Newport.

JUNIOR RESIDENT MEDICAL OFFICER (A)
(TEMPORARY APPOINTMENT).

Applications are invited from registered medical practitioners for the above appointment at WOOLOSTON HOUSE HOSPITAL, Newport. Salary £150 per annum, with the usual residential emoluments, plus a cost-of-living bonus. All fees with the exception of coroners' fees are payable to the Public Assistance Committee. Appointment terminable by one month's notice on either side. R practitioners within three months of qualification may apply.

Applications, stating age, qualifications, and experience, and accompanied by copies of three recent testimonials, should be sent at once to: TOM KAY, Public Assistance Officer.

Town Hall, Newport, Mon., February, 1942.

Royal Devon and Exeter Hospital,
EXETER.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a THIRD HOUSE SURGEON (A), to become vacant on the 21st March, 1942. R practitioners within three months of qualification may apply when appointment will be for a period of six months. Salary is at the rate of £160 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent not later than the 7th March, 1942, to—
L. PARKHOUSE, Secretary and Manager.

City of Birmingham Education
COMMITTEE.

An ASSISTANT SCHOOL MEDICAL OFFICER (Woman) is required to begin duty about May, 1942. Candidates must have had at least three years' experience in the practice of their profession subsequent to obtaining a registrable qualification. Salary according to "Askwith" scale (£500 to £700 by annual increments of £25). In fixing commencing salary previous service in Class II of "Askwith" scale may be taken into account; £10 per annum travelling expenses allowed.

Forms of application (to be returned not later than first post on Thursday, 12th March, 1942), together with further information, obtainable from the undersigned on receipt of stamped, addressed foolscap envelope. Communications should be endorsed "Assistant School Medical Officer." Canvassing will disqualify. P. D. INNES, Chief Education Officer.

Education Office, Margaret-street, Birmingham, 3,
14th February, 1942.

Isle of Ely County Council.

Applications are invited for the appointment of DEPUTY COUNTY MEDICAL OFFICER AND DEPUTY SCHOOL MEDICAL OFFICER.

Candidates should have had considerable administrative experience in all branches of public health, and particularly in civil defence work.

Experience in refraction and in mental deficiency is very desirable.

Salary £700 per annum, rising by annual increments of £25 to £800 per annum, together with a travelling allowance on the Council's scale.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Canvassing, directly or indirectly, will disqualify.

Applications on a form supplied upon request, accompanied by copies of three testimonials, should reach the County Medical Officer, County Hall, March, not later than the 9th March, 1942.

R. F. G. THURLOW, Clerk of the County Council.

County Hall, March, 12th February, 1942.

Essex County Council.

PUBLIC HEALTH DEPARTMENT.

Applications are invited from registered medical practitioners possessing experience of administrative work for the post of ASSISTANT MEDICAL OFFICER on the Central Staff of the Council's Public Health Department.

The duties of the officer will be chiefly to assist in the administration of hospitals, sanatoria, public assistance establishments, and the tuberculosis services of the Council.

The salary attaching to the post will be at the rate of £650 a year, rising, subject to satisfactory conduct and service, by annual increments of £25 to £700 a year, but the commencing salary may be varied, having regard to the experience and capabilities of the candidate appointed.

Forms of application may be obtained from the undersigned to whom they should be returned completed, accompanied by copies of three recent testimonials, and in envelopes endorsed "Assistant Medical Officer," not later than 9th March, 1942.

Canvassing, whether directly or indirectly, is forbidden.

JOHN E. LIGHTBURN, Clerk of the County Council.

County Hall, Chelmsford, 16th February, 1942.

East Suffolk and Ipswich Hospital,
IPSWICH. (400 Beds.)

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1) to this Hospital and Medical Superintendent to the Branch Hospital (50 Beds). Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply. Salary £500.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent to—
ARTHUR GRIFFITHS, Secretary.

The Hospital, Ipswich, 21st February, 1942.

The Children's Hospital, Sheffield (Inc.)
(157 Beds.)

Applications are invited from registered medical practitioners Male and Female (including R practitioners within three months of qualification), for the appointment of HOUSE PHYSICIAN (A), to become vacant on the 1st March, 1942. The appointment is for a period of six months, with salary at the rate of £100 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to the undersigned. The successful candidate must be a member of a Medical Defence Society.

T. H.G. GARTLAND, Superintendent and Secretary.

Wingfield-Morris Orthopædic Hospital,
OXFORD.

RESIDENT HOUSE SURGEON (B1) (Male) required for six months. Salary at the rate of £120 per annum. Suitably qualified R practitioners holding B2 or B1 posts may apply.

Applications, with testimonials, should be sent to Professor H. J. SEDDON immediately. Duties to commence soon after appointment.

Huddersfield Royal Infirmary.
(321 Beds.)

Male CASUALTY OFFICER (B2) required to commence duty on 18th March, 1942. Salary £200 per annum, with board, residence, and laundry. Appointment for six months, subject to renewal for a similar period. R practitioners who now hold A posts are invited to apply when appointment will be limited to six months. The Hospital is officially recognised for the surgical practice required of non-members before admission to the Final Fellowship Examination of the Royal College of Surgeons of England. The post of Casualty Officer is next in seniority to that of Resident Surgical Officer.

Applications, with copies of three recent testimonials, to be addressed immediately to—
H. J. JOHNSON, General Superintendent and Secretary.

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North Staffordshire Royal Infirmary, STOKE-ON-TRENT.

Applications are invited from registered medical practitioners (Male and Female), including those within three months of qualification, for the following posts, vacant 31st March, 1942 :—
Two HOUSE SURGEONS (A).
One RESIDENT ANÆSTHETIST (A).
Salary will be at the rate of £150 per annum, with board, residence and laundry, and the appointment will be for six months.
Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of three recent testimonials, should be sent as soon as possible to the HOUSE GOVERNOR.

Bracebridge Heath Mental Hospital, BRACEBRIDGE HEATH, Near LINCOLN.

TEMPORARY ASSISTANT MEDICAL OFFICER (B1).
Applications are invited from registered medical practitioners (Male or Female) for the above (whole-time) appointment. R practitioners should not apply. Salary £8 8s. per week, with the usual residential emoluments. Additional £50 per annum if holder of the D.P.M. (Eng.).
Apply, with copies of testimonials, to the MEDICAL SUPERINTENDENT.

Grimsby and District Hospital.

Applications are invited from Male or Female registered medical practitioners for the appointment of a HOUSE PHYSICIAN (A). R practitioners within three months of qualification may apply, when appointment will be for a period of six months. Salary is at the rate of £175 per annum, with full residential emoluments. Duties to commence 1st April, 1942.
Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent immediately to—
H. B. COATES, Secretary-Superintendent.
23rd February, 1942.

Jenny Lind Hospital for Children, NORWICH.

Applications are invited for the post of RESIDENT MEDICAL OFFICER. Salary £120, with board, residence, and laundry. Candidates (Female), who must possess registered qualifications, should forward applications, stating age, experience, &c., together with copies of testimonials, not later than the first post on Monday, 9th March, to: FRANK INCH, Secretary.
27th February, 1942.

Stirling District Mental Hospital, LARBERT.

Applications are invited from registered medical practitioners for the appointment of SENIOR ASSISTANT MEDICAL OFFICER (B1) (Temporary—war emergency). Previous mental hospital experience essential. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply, but they must have obtained the sanction of the S.C.M.W.C. to their application. Salary £500 per annum, with additional £50 if holder of D.P.M., and the usual residential emoluments.
Apply, in writing, with copy of testimonials, to the MEDICAL SUPERINTENDENT.

Horton General Hospital, Banbury, OXON.

Applications are invited from registered medical practitioners (Male or Female) for the post of HOUSE SURGEON (B2), post vacant 6th March. R practitioners who now hold A posts may apply when appointment will be limited to six months. Salary at the rate of £150 per annum, with board, residence, and laundry.
Applications, with testimonials, and stating age, to—
RICHARD H. PRESCOTT, Secretary and House Governor.

City of Portsmouth.

SAINT MARY'S HOSPITAL (1200 Beds.)

Applications are invited for the appointment of JUNIOR ASSISTANT RESIDENT MEDICAL OFFICERS (A). R practitioners within six months of qualification may apply when appointment will be limited to six months, otherwise it will be for a period of twelve months. Salary at the rate of £250 per annum, with residential emoluments valued at £125 per annum.
Application forms may be obtained from, and returned to, the Medical Officer of Health, Northern Secondary School, Portsmouth.
F. J. SPARKS, Town Clerk.
Municipal Offices, Royal Beach Hotel, Southsea.

Bradford Children's Hospital.

HOUSE SURGEON (A) (Male or Female) wanted 28th March. R practitioners within three months of qualification are invited to apply when appointment will be for a period of six months. Salary £150 per annum, with board, residence, and laundry.
Applications, stating age and nationality, with recent testimonials, should be sent not later than 16th March to—
J. W. LONGLEY, Secretary-Superintendent.

County Borough of South Shields.

MATERNITY HOSPITAL.

Applications are invited from fully qualified and registered Women medical practitioners for the appointment of an ASSISTANT RESIDENT MEDICAL OFFICER (B1) for duty at the South Shields Maternity Hospital. Salary £350 per annum, rising by annual increments of £25 to £450 per annum, together with emoluments valued at £100 per annum. The salary and the emoluments are subject to a deduction for Superannuation purposes. The successful candidate will be required to pass a Medical Examination.
Applications on forms to be obtained from the Medical Officer of Health, Public Health Department, Stanhope-road, South Shields, stating experience and qualifications and accompanied by copies of two recent testimonials to be sent to him not later than 10th March, 1942.
Canvassing of members of the Council, of Chief Officers of the Council, or of the Deputy Chief Officers, will disqualify the candidate for the appointment.

Cumberland Infirmary.

(200 Beds.)

Applications are invited from registered medical practitioners for the following posts vacant from the 1st April next: 3 RESIDENT MEDICAL OFFICERS (A) (Male). The duties of one to be mainly medical and of the other two to be mainly surgical. Salary in each case at the rate of £160 per annum, with board, &c. R practitioners within three months of qualification may apply when appointment will be for a period of six months.
Applications must be made on forms obtainable from the SECRETARY-SUPERINTENDENT and received by him duly completed together with testimonials not later than first post on the 9th March, 1942.
Carlisle, 23rd February, 1942.

Southend-on-Sea General Hospital.

Applications are invited from registered medical practitioners (Male) for the post of JUNIOR HOUSE SURGEON (A), with casualty duties. R practitioners within three months of qualification may apply. Salary at the rate of £150 per annum, with full residential emoluments. The appointment is for six months, and is vacant now.
Applications, stating age, qualifications, nationality, and accompanied by copies of two recent testimonials, to be sent at once to: P. H. CONSTABLE, House Governor and Secretary.

University of Bristol.

Applications are invited from medically qualified Women for the post of LECTURER IN ANATOMY. Salary £400 per annum.
Applications should reach the undersigned (from whom further particulars may be obtained) as soon as possible, and not later than 16th March, 1942.
WINIFRED SHAPLAND, Secretary and Registrar.

Locum Tenens £8 8s. per week, plus

board and lodging for at least two months.—Apply MEDICAL SUPERINTENDENT, County Mental Hospital, Lancaster.

London, N.W.9—Wanted, Medical

PRACTITIONER for part-time work on medical supervision in a factory engaged on war supplies, situated in the area Hendon-Edgware-Wembley. Applications are invited from medical Men or Women in the neighbourhood, with full particulars of qualifications, &c., to: Address, No. 849, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Woman Assistant wanted for Country

Practice, for duration or with view permanency or partnership. Local hospital facilities; easy reach London. Live in at start.—Particulars to: Address, No. 850, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

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